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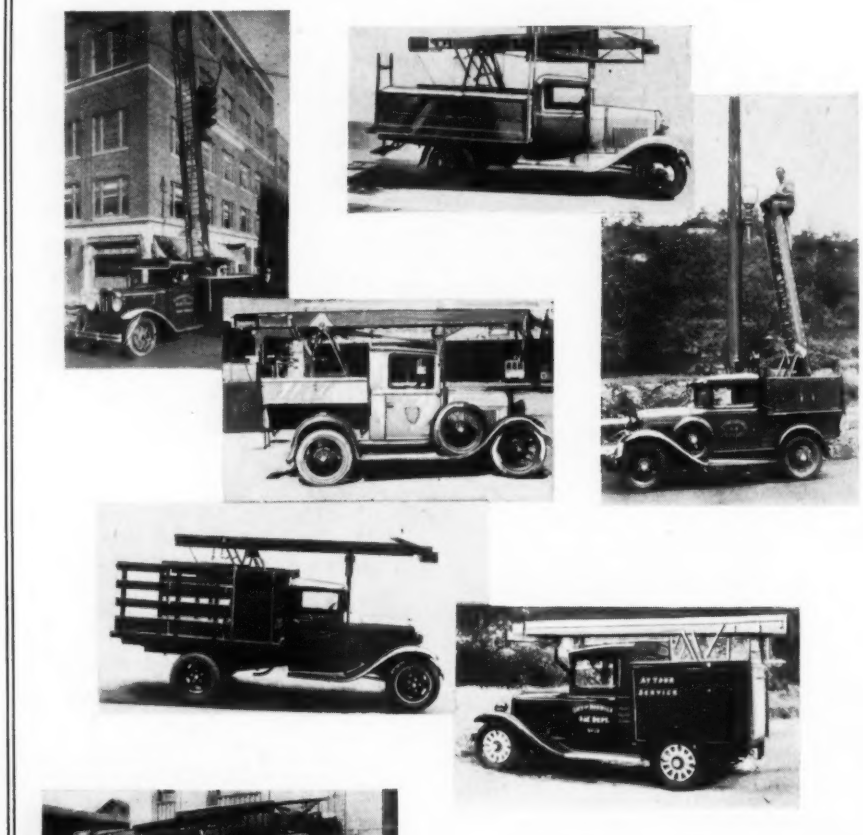

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ELECTRICAL WORLD

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for the Week Ending

August 27, 1932

Russia Completes Hydro on the Dnieper River

Completion of the world's largest hydro-electric power project was celebrated by the Soviet régime in Russia on Thursday of this week when the Dnieper River dam and power plant were dedicated. In the opinion of the Soviet the beginning of operations at the plant will be the greatest achievement of its program to date.

The power plant includes nine hydraulic turbines with a normal generating capacity of 756,000 hp., comparing with 502,000 hp. at Queenston on the Canadian side of Niagara River, 452,500 in the largest plant on the United States side, 378,000 now installed at Conowingo and 260,000 hp. at Muscle Shoals. Its maximum capacity is 900,000 hp.

The actual cost of the dam and the power plant was $11,000,000, and the cost of the entire Dnieprostroy project, involving the construction of numerous industrial enterprises and a Socialist city, is placed at $420,000,000. The number of workers employed has at times reached 50,000, and the work has been completed in slightly more than five years, having been started in March, 1927.

The project will provide power for industrial and domestic use to a territory of 70,000 square miles with a population of 16,000,000 persons. It will be the heart of a great steel manufacturing center now in process of construction. The great storage of water provides a reservoir from which thousands of acres of farm lands on the surrounding steppe will be irrigated.

2,000,000-kw. project planned

The Council of People's Commissaries of the Soviet government has recently issued a decree concerning the construction of a large hydro-electric station to provide for the irrigation of an area of about 11,250,000 acres of steppe land on the left bank of the Volga River. The new station, which is to be built at Kamyshin, on the Lower Volga, 100 miles south of Saratov, will be of two million kilowatt capacity, or nearly four times the size of the Dneiper hydro-electric station. The construction of the station will involve the building of a dam two miles in length and 98 ft. in height. The whole enterprise is to be completed in 1937. The chief difficulty is the fact that the area to be irrigated is considerably higher than the Volga. It will therefore be necessary every year to raise 5,500,000,000 gallons of water a height of from 196 to 328 ft. for irrigation purposes. The method of irrigation used will be a new one; instead of allowing the water to flow in ditches, it will, it is said, be distributed as a sort of rain.

This Week

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Alabama commission releases power company payments p. 260

Central Public Service Plans Reorganization

Drawn up in anticipation of financial difficulties which might otherwise have arisen, rather than as an aftermath of such difficulties, a plan has been presented to security holders of the $357,000,000 Central Public Service Corporation system for reorganization. Deposits of securities for exchange are being requested and two new corporations have been formed.

The first new company is the Central Public Utility Corporation, which owns or will own the entire equity in the Central Public Service system as it previously existed. This company will eventually supersede Central Public Service as the top company in the group.

The second company is the Consolidated Electric & Gas Company, which has acquired from Central Public Service most of its interests in its subsidiaries, including the Southern Cities Public Service Company, Central Gas & Electric Company and Southern Cities Public Utility Company. Holders of securities in all these three companies are asked to exchange.

As a result of the reorganization, Central Public Service is enabled to pay its August 1 coupons on debentures, and arrangements have been made for an extension and gradual decrease of its bank loans.

▼

Protest on Power Lines Near Aviation Field

While airport officials and pilots protested to Mayor Jackson of Baltimore, progress in constructing a 220-kv. transmission line of the Consolidated Gas, Electric Light & Power Company, near the airport, has continued.

President Wagner of the utility

states: "When the towers are completed and the lines installed, they will not be a menace to aviators, in our opinion. The former will be marked with lights at night, and will be no higher than certain trees growing now between the routes for the lines and the airport. The sites for the towers were selected with the advice of the aviation section of the Department of Commerce.

Pending the outcome of conferences now being held the utility company has agreed not to string the conductors, although the towers are being completed.

▼

Debenture Holders Sue for Insull Collateral

Decision of the Circuit Court of Appeals in the dispute over collateral between the receivers of Insull Utility Investments and creditor banks in New York is awaited with interest and the proposed auction of pledged securities is put off almost daily.

New York loan collateral represents only a fraction of the securities pledged at the banks by the Insull investment trust. The decision, however, will influence the action to be taken by the banks on other Insull collateral. Only four of the ten banks in New York and Chicago that hold the collateral have attempted to "reduce to possession" the pledges. The injunction of Federal Judge Lindley restraining the sale was appealed by the banks, which argued that the federal court in Chicago lacked jurisdiction over collateral deposited in New York. They charged that the delay in the sale resulted in a further loss to them because the market value of the collateral had depreciated more than $3,000,000 after the injunction was issued.

The filing last week of a petition in the federal District Court in Chicago by holders of debentures of Insull Utility Investments, Inc., to compel the banks to surrender the securities that they hold as pledges for loans made to the company further complicated the situation. The collateral involved consists of large blocks of stocks of the three big local utility companies that were under the management of Samuel Insull. The bill asserts that the securities were improperly pledged. The banks accepted the stocks as collateral, although they were aware that pledging of the securities was a violation of the debenture holders' rights, the bill contends. The General Electric Company is named defendant in the suit with the banks. It was disclosed that that company had made a loan to the Insull investment company late last year for which it received as security blocks of shares in five Insull companies.

The Corporation Securities Company is not directly involved in the latest litigation, but if the debenture holders of Insull Utility Investments carry their point it is expected that the holders of notes of Corporation Securities would take similar action.

▼

Indiana Governor Balks at City Utility Bill

One of the contentions of Governor Leslie of Indiana in this week refusing to sign a public utility bill recently passed by both legislative houses in Indiana (ELECTRICAL WORLD, August 20, page 226), was that it would "open the way for the sale of an unlimited amount of utility equipment to municipalities." Governor Leslie's action constitutes a pocket veto.

In setting forth his objections to the measure the Governor in a memorandum included a statement of the opinion of Attorney-General James M. Ogden that a section of the bill barring the Indiana Public Service Commission from jurisdiction over municipal plants could not become effective for five years.

The Governor also took exception to the "perpetual threat of confiscation of the property of any privately owned public utility now giving adequate service" as a violation of "every sound principle of public utility construction, operation and regulation." It was also contended that the measure "would put all the utilities, both municipal and private, into local politics."

▼

California Edison Sues to Halt City Steam Station

Alleging that an illegal waste of $7,000,000 of city funds by the Los Angeles Power Bureau is threatened in the proposed construction of a steam plant at the harbor, and seeking an injunction restraining such expenditure, a taxpayers' suit was filed last week against officials of the Power Bureau and other city officials by Southern California Edison Company, Ltd., and others on behalf of themselves and all other taxpayers.

In support of the charge that the expenditure of $7,000,000 on a steam plant would be a waste of this amount, the complainants allege that by the fall of 1935 or not later than January 1, 1936, the Power Bureau will begin to receive an enormous supply of electric energy from the Boulder Canyon dam and that this supply of Hoover Dam power will be "far in excess of any possible demand which will be placed upon the city's system for from ten to fifteen years in the future." Pointing out that the steam plant would not be ready for operation before January 1, 1934, and would be of no use except for standby service after Boulder Canyon power is available, the expenditure upon the steam plant is thus alleged to be ill-advised and wasteful.

The complaint discloses a written offer previously made to the Power Bureau by the Edison company, in which the company offers to provide the full equivalent of the service which would be made available by the proposed steam plant at a net over-all saving to the city during the next ten years of at least $1,000,000 of public funds.

▼

Vermont Utilities Suggest Revision of Tax System

In place of the present Vermont tax of one-half mill per kilowatt-hour on energy generated within the state, it is proposed to substitute revenue and franchise taxes upon retail and wholesale utilities on the ground that these methods of assessment are more equitable and flexible than the existing rigid excise.

At a hearing last week in Montpelier before the special tax commission investigating this subject under the chairmanship of Jeremiah Evarts representatives of the New England Power Association and of the so-called Insull utility group operating in Vermont sought relief from the burdens of the kilowatt-hour-generated energy taxes, which now amount to about $250,000 per year in meeting the requirements of the emergency legislation passed in 1930 to provide added revenue for the state.

Charles A. Coolidge, Jr., of Boston, a well-known taxation authority, has suggested to the commission on behalf of some of the utility companies that the generated energy tax be superseded by (a) a 3 per cent revenue tax on the sales of retail or distributing companies corresponding to the present federal revenue tax and collectible from domestic and commercial customers, and (b) a tax of 4 per cent on the net income before state taxes of wholesaling electric companies engaged primarily in the production and transmission of bulk energy.

It is estimated that the proposed revenue tax on retail companies would yield a revenue of about $110,000 per year to the state and that the franchise tax on wholesale companies will yield about $90,000 per year. At the hearing the utilities stressed the importance of flexible taxation, responsive to the varying economic conditions under which the companies operate, and opposed the present kilowatt-hour tax as burdensome, not only in its total amount but in its rigidity and inequity with respect to primary and secondary energy produced under a wide range of cost conditions.

Pearl Street Anniversary to Be Celebrated Soon

Plans are being made in New York to celebrate the fiftieth anniversary of Thomas A. Edison's first permanent commercial electric lighting system, according to an announcement by Frank W. Smith, president of the New York Edison Company.

The celebration will be held on two dates—September 4 and 12. On the first there will be a brief ceremony at the site of the old Pearl Street station. The second celebration will be a dinner at the Waldorf-Astoria, to which representatives of the electrical industry in its various branches and of civic, scientific and engineering bodies are being invited.

Mr. Smith reminds that Edison's first station opened with 59 customers and with a generating plant of six dynamos, each of which could light from 1,200 to 1,750 16-cp. incandescent lamps. Today through the electric companies affiliated with the Consolidated Gas System, he said, there are more than 2,000,000 consumers supplied, with a total generating capacity in the various plants which represents power to light more than 47,000,000 50-watt lamps.

The pioneer company had a capitalization of $1,000,000. Today about $13,000,000,000 is invested in the industry in the United States. The original 750-hp. capacity of the Pearl Street station has grown to 46,000,000 hp. in the United States.

▼

Banks Serve Utility as Bill Collectors

For the convenience of utility customers many banks in Connecticut now act as collection agents for the payment of electric service bills. In mill villages, where a large percentage of the customers have no checking accounts, such as at Moosup and Plainfield in the Danielson district of the Connecticut Light & Power Company, this service proves especially useful and in many cases saves the purchase of a cashier's check or money order costing 5 cents in addition to postage. The plan was in use for some time prior to the passage of the recent federal tax law. These banks are employed as depositories for company funds in many cases.

▼

R. H. Ballard Dies Suddenly

Russell H. Ballard, president of Southern California Edison Company, Ltd., died suddenly August 24. The report which reached ELECTRICAL WORLD as it went to press, indicated that death resulted from a relapse following an attack of influenza, suffered a month ago, from which he was apparently recovering. An outstanding figure in the electrical industry of the United States for many years, he was named president of the company in 1928.

▼

Pennsylvania Inquiry May Be Political Battle

That the Senate inquiry into the affairs of the Pennsylvania Public Service Commission promises to involve a first-class political battle between the Pinchot and anti-Pinchot forces seems evident. The Governor has signed the $100,000 appropriation measure to provide funds for the prosecution of the investigation after several open breaks with the Senate.

The terms of the Senate resolution are judged sufficiently vigorous to set on foot the most far-reaching and comprehensive inquiry into any subject of public importance in Pennsylvania since the Capitol graft scandals of twenty years ago. The resolution, however, incorporated phrases which throw on the Governor direct blame for the failure to permit certain reform legislation to become law in 1931.

The investigation will probably start in two weeks and a report to the 1933 Legislature for action is stipulated. Senator Rial is chairman of the special investigating committee of seven.

Governor Pinchot has vehemently denounced the organization for inquiry, stating "that the Senate and the Republican state organization have been forced to investigate against their will, and intend to whitewash if they can. What the people want to know isn't what laws can be amended but who bribed whom. They want to know how much the briber paid and what he got in return. Especially they want to know whether, because of the bribing, they are now paying rates and charges that are unjust and excessive, and if so, how much the bribery is costing them."

▼

Pennsylvania Installs Five-Inch Copper Bus

Some 70,000 lb. of 5-in. extra heavy copper tubing makes the main bus of the Richmond substation of the Pennsylvania Railroad at Philadelphia an outstanding one. The tubing has an outside diameter of 5.563 in. and an inside bore of 4.813 in. with a weight of 23.7 lb. per foot. This large cross-section is required to provide a carrying capacity of 5,000 amp. on this 13.2-kv., 25-cycle ring bus, which is divided into four sections and has 2,500,000 kva. breakers between sections. The designed short-circuit current is 109,000 amp. Anaconda Wire & Cable Company and its associate, the American Brass Company, furnished the copper bus.

Stocks and Bonds Rise; Indexes Obdurate

AFTER thinking it over during the week end the little fellows decided that they had to have more stock and bond certificates. Early and eager buying orders whirled securities up 1 to 10 points. Many of the important issues which still pay dividends are now selling at prices representing at least twelve to fifteen times current earnings. Observers see this as a 1 to 2 year discount of possible industrial improvement and counsel caution.

Meantime the big push continues with pressure applied for the rise of business at many points. So far the only reaction has apparently been in the cotton textile industry, which reports progress in sales, employment and reduced stocks. Unpleasant facts are that steel production is at 19.8 per cent of capacity, or virtually the low point; automobile production has sagged to 26.8 per cent, the lowest of the year, due largely to the Ford shut-down; car loadings, at 48.8, show nothing more significant than resistance to further decline; business indexes stand steady; power production shows no appreciable increase in consumption.

It appears almost inevitable that gains in trade, even though temporary should result before long. Too many factors which lead to an expansion have been touched not to have started something. The world's biggest gamble is not going to fail without a real struggle and all the world is looking for the sunrise as an advanced class in metaphysics.

▼

Small-Company Rates Cut by Michigan Commission

As a result of a recent survey of rates charged by the companies serving small areas, the Michigan Public Utilities Commission is reported to have agreed that more than a score are earning in excess of 7 per cent. Orders are to be issued demanding that the charges for power and gas furnished by these firms be reduced at once.

The list of companies has not been made public. It is said, however, not to include any of the larger utilities such as the Consumers Power Company, the Detroit Edison Company or the Federal Utilities Corporation.

Representatives of 40 Michigan municipalities met last week to discuss methods to compel power corporations to lower their charges. Plans were made for opening rate cases before the Utilities Commission and several speakers discussed the feasibility of constructing municipal power plants by borrowing funds from the Reconstruction Finance Corporation.

Coming Meetings

American Institute of Electrical Engineers—Pacific Coast convention, Vancouver, B. C., Aug. 30-Sept. 2. Middle Eastern District Meeting, Baltimore, Md. Oct. 10-13. H. H. Henline, 33 West 39th St., New York.

Great Lakes Division, N.E.L.A.—Engineering Section, Milwaukee, Wis., Sept. 6-8. Executive conference French Lick Springs, Ind., Oct. 6-7. T. C. Polk, 20 N. Wacker Drive, Chicago.

Pennsylvania Electric Association—Bedford Springs, Pa., Sept. 7-9. H. A. Buch, Telegraph Bldg., Harrisburg.

Rocky Mountain Division, N.E.L.A.—Stanley Hotel, Estes Park, Colo., Sept. 12-14. G. E. Lewis, 367 Gas & Electric Bldg., Denver.

Empire State Gas and Electric Association—Saranac Inn, N. Y., Sept. 22 and 23. C. H. B. Chapin, Grand Central Terminal, New York.

Electrochemical Society — Cleveland, Ohio, Sept. 22-24. Colin G. Fink, Columbia University, New York.

Illuminating Engineering Society—New Ocean House, Swampscott, Mass., Sept. 26-30. E. H. Hobbie, 29 W. 39th St., New York.

National Electrical Wholesalers Association—Hotel Statler, Buffalo, N. Y., Sept. 26-30. E. Donald Tolles, 165 Broadway, New York.

American Welding Society — Buffalo, N. Y., Oct. 3-7. M. M. Kelly, 29 West 39th St., New York.

National Safety Council—Washington, D. C., Oct. 3-7. W. H. Cameron, 20 N. Wacker Drive, Chicago.

Association of Electragists International—Kansas City, Mo., Oct. 10-12. L. W. Davis, 420 Lexington Ave., New York.

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Refrigerators Stolen on Pretense of Repairs

Newest among the rackets is the stealing of electric refrigerators by supposed repairmen who represent themselves as authorized individuals and remove the box for allegedly necessary shop adjustments.

Said to have gained a good foothold in Chicago, where, according to H. H. Walker, Norge Company official in St. Louis, "between 500 and 1,000 refrigerators were stolen," the racket is spreading to other cities. St. Louis' first victim has parted with his refrigerator and warnings have been issued to home owners there to check with the sales agency before permitting removals.

▼

Alabama Power Cleared by Commission Inquiry

The Alabama Public Service Commission has completed an intensive inquiry into the reasonableness of fees paid by two Alabama public utility operating companies to the parent concerns, and has rescinded its order restraining payment of such fees. (ELECTRICAL WORLD, July 23, page 98.)

The companies affected are the Alabama Power Company and its parent holding company, Commonwealth & Southern Corporation, and the Southern Bell Telephone & Telegraph Company and its holding company, the American Telephone & Telegraph Company.

In its reports the commission virtually absolves the two companies from any irregularities in the payment of dividends or management fees.

Other companies will come under the scrutiny of the commission, which in turn may permit them to go ahead with their usual financial relations with their holding companies once they have satisfied the utility board that no malpractices exist. The regulatory body has ruled that no payments may be made to parent concerns by operating units without utility board approval.

▼

Federal Trade Commission Hearings Near the Final Stage

AFTER four and one-half years of persistent search into the affairs of electric utility holding companies, the Federal Trade Commission is preparing to start on the final stages of its general inquiry.

The commission before completing its investigation will take further testimony concerning certain aspects of holding companies already studied. Various reports concerning sub-holding companies and other units of the Associated Gas & Electric system will be the subject of examination when hearings are resumed this fall.

Organizations not yet examined but slated for action are: Cities Service Company, Columbia Gas & Electric Corporation, Niagara Hudson Power Company, United Gas Improvement Company, Illinois Traction Company and Illinois Power & Light Corporation.

In the meantime, accountants and engineers of the commission are continuing their field work and preparation of reports for coming hearings. About 40 companies are said to be in the process of examination.

Holding company groups covered to date are: American Gas & Electric, W. B. Foshay, Southeastern Power & Light, New England Power Association, North American, Middle West Utilities, Standard Gas & Electric, North American Light & Power and Associated Gas & Electric.

Interstate power figures emphasized by commission

In the forthcoming report of the Federal Power Commission (ELECTRICAL WORLD, August 20, page 229) emphasis will once more be placed on the figures for interstate transmission of energy. While some observers contend that only net interchange should be reckoned, others hold out for a tally of all energy crossing state lines. Needless to state such figures never check. The commission desiring to show a relatively large interchange will emphasize factors and data supporting that contention.

Advance releases indicate that the report will show in the Electric Bond & Share system the interstate business, computed in terms of the licensee output, to range for the different units from 9 per cent for the Idaho Power Company to more than 70 per cent for the Utah Power & Light Company and 74 per cent for the Carolina Power & Light Company.

For the Middle West Utilities group corresponding figures are 24.7 per cent for Florida Power Corporation, 22.5 per cent for Kentucky Utilities. In the Central Public Service group the interstate transmission is less than 4 per cent. In the two licensed companies coming under the Standard Gas & Electric group the Louisville Gas & Electric Company reports 17.7 per cent and the California-Oregon Power Company 34 per cent.

The figures for the Commonwealth & Southern group will show that the licensed plants of the Alabama Power Company and the Georgia Power Company contribute about 46 per cent of the power put into a pool from which nearly 20 per cent of the current moves across state lines.

The sharpest contrast drawn between systems is pointed out in the middle Eastern states. The Niagara-Hudson group, which ranks first among the federal licensees in the amount of power generated, transmitted no current out of the state of New York. On the other hand, the Susquehanna Electric Company of the United Gas Improvement group delivers at the state line 98.4 per cent of the output from its Conowingo plant.

In the commission report there will also be a table showing sales of power by several of the licensees to large customers. The prices vary from between 3 and 3½ mills for the Niagara Power Company and about 8 mills for the California-Oregon Power Company, to over 2 cents for subsidiaries of the Middle West group. For the 2½ years recorded the trend of prices showed no uniform direction, the net change, however, from January, 1929, to June, 1931, being in most cases downward.

Other tables serve as exhibits of the trend in character of sales, a general tendency being shown in this period for sales for commercial and domestic uses to increase progressively, along with the falling off in sales for industrial use.

Electric Bond & Share Ordered to Testify

At least one round of a four-year-old battle to keep details of its financial affairs from the too-intimate delvings of Federal Trade Commission investigators was lost by the Electric Bond & Share Company last week when Federal Judge John C. Knox ordered the corporation to comply with the subpœna issued by the commission on October 3, 1928.

The subpœna called upon the company to produce its vouchers and ledgers showing its operating expenses. The company and its officials refused to heed the subpœna and also to answer questions on the ground that the commission had no jurisdiction.

The commission's alleged lack of jurisdiction was based on the company's contention that it did not engage in interstate trade. Judge Knox concluded that although the company itself might not have been engaged in interstate commerce, its subsidiaries had been so engaged. He ordered that information regarding operating, purchasing and other service fees and the cost of rendering them be made available.

Should the company appeal Judge Knox's ruling to the Federal Court of Appeals and the decision be upheld there the matter might reach the Supreme Court, Commissioner McCullough of the Federal Trade Commission points out.

Pending the decision on Electric Bond & Share, the commission has proceeded with its inquiry, the other holding companies and operating concerns permitting access to their records.

▼

Staten Island Edison to Get Bond Rehearing

The New York Public Service Commission has announced that a rehearing on the petition of the Staten Island Edison Company for authority to issue $8,500,000 of first and refunding mortgage gold bonds will be granted. The rehearing will begin September 8.

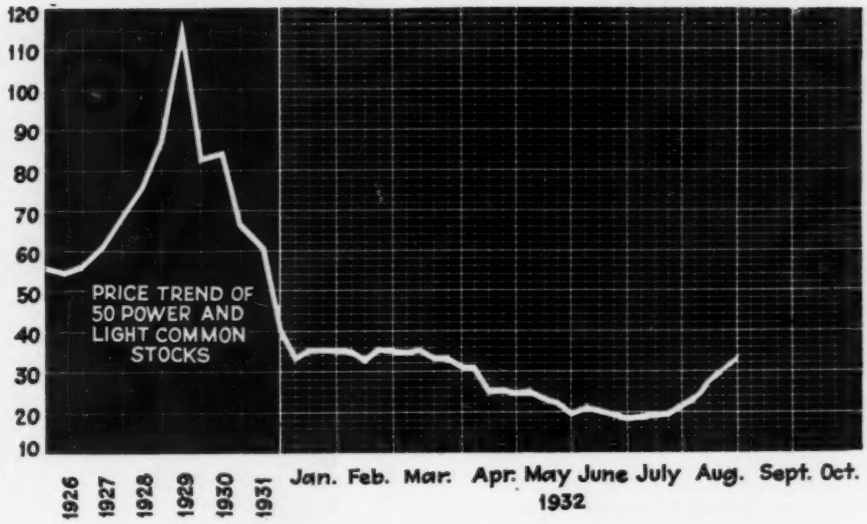
The original petition was denied under a ruling handed down by Chairman Milo R. Maltbie and approved by the commission. The company is a subsidiary of the Associated Gas & Electric Company.

▼

Auction to Wind Up Tri-Utilities

Orders for the sale of the remaining assets of Tri-Utilities Corporation, now in receivership, have been issued in the United States court, Wilmington, Del. The assets are to be disposed of at public auction on August 30. The receiver will accept minimum bids for principal parcels of stocks and other assets of $10,850 of Tri-Utilities.

Stocks Continue Upward Swing



The forward impetus in stock prices continued during the past week, many issues showing substantial gains. Utility stocks were especially strong. The "Electrical World" index advanced to 32.1, as compared with 29.3 for the preceding week, the highest point recorded since March.

▼

Exeter Company Loses in Arbitration

Twenty per cent reduction in local street lighting revenue has been determined by the Public Service Commission of New Hampshire as the board's award in arbitrating this cause between the town of Exeter and the Exeter & Hampton Electric Company. The estimated annual revenue under the new rates will be $9,978, against $12,477 under the previous contract. The company estimated that $14,101 would be required to yield an 8 per cent return on the investment for this business in Exeter. The commission has no jurisdiction over street-lighting rates in New Hampshire, but sat in the case at the invitation of the parties. No reasons for its finding were set forth by the board, and considerable disappointment has been expressed in utility circles over the rates recommended.

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Security Sales Protested in Pacific Northwest

Pacific Northwest Public Service Company of Portland, Ore., has been made the defendant in a number of suits instituted by investors who allege that fraudulent means were adopted by the utility's stock salesmen in inducing them to accept in trade for their securities the bonds issued by the Portland General Electric Company, a parent concern.

The complainants allege that the securities of the latter utility are "practically worthless" at present, while the issues of the Pacific Northwest Public Service Company are of tangible value. The utility, in answers filed by it, denies that any representative of that company offered any inducements calculated to encourage a trade in stocks of the two firms, as alleged, and that the issues were in charge of, and handled by, regular licensed brokers engaged in the securities selling business.

▼

North Carolina Hearings on Rates to Be Pushed

Dates for hearings of North Carolina utilities preliminary to presumed rate reductions have been set by the State Corporation Commission. Carolina Power & Light was scheduled for this week, with Durham Public Service Company, Southern Public Utilities and subsidiaries and Tidewater Power Company to follow later.

Hearings for other companies will be scheduled later. The hearings will be *ex parte*, but it has been said that the public will be admitted to them.

The Corporation Commission announced July 20 its intention to effect "such immediate reductions in rates as may be legitimately possible under present conditions." It was said the commission was determined "that the lowest rate which will yield a fair return shall be promptly put into effect."

The commission, in an order said to be without precedent in that state, directed electric, gas and transportation

companies operating in North Carolina to prepare to send representatives to confer with the commission.

▼

A.I.E.E. Members Appointed to Engineering Status Board

Representatives of the American Institute of Electrical Engineers to serve on the Engineers' Council for Professional Development have been selected. President Charlesworth has appointed C. O. Bickelhaupt, vice-president Southern Bell Telephone & Telegraph Company; L. W. W. Morrow, editor ELECTRICAL WORLD, and Charles F. Scott, professor of electrical engineering Yale University, as the institute's delegates.

The Engineers' Council for Professional Development is the outgrowth of a joint action by various engineering societies in a move to better the economic status of the engineering profession. The plan was approved by the A.I.E.E. board of directors on June 22, 1932, and has been ratified by sufficient co-operating organizations to make it effective.

▼

Beauharnois Development Nears Operating Stage

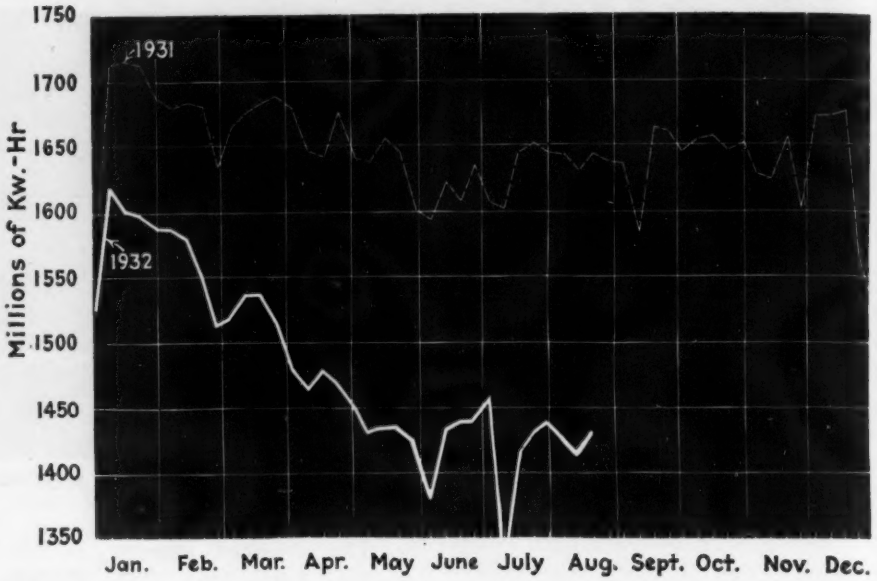
Power may be delivered from the Beauharnois Power Corporation development on the St. Lawrence River by October 1 if the present rate of progress is maintained. The installation at Melocheville, Lake St. Louis, has already been completed to the extent of a 200,000-hp. development. Last week water began to flow into the canal from Lake St. Francis. September will be devoted to testing out the machinery.

The present project involves 500,000 hp., but ultimately 2,000,000 hp.

Provincial commentators differ in their reactions to the news of impending completion. In Quebec the news is said to have caused considerable jubilation for the corporation is assured of an income of $3,750,000 per year through the sale of contracted-for energy to the Hydro-Electric Power Commission of Ontario. The Quebec provincial treasury will collect $250,000 per year from rental of water rights. In Ontario there is less rejoicing for the Hydro system already has on its hands far more power than its customers require. The net effect of the delivery of the Beauharnois power will probably be to complicate existing problems and to add to the burdens on Hydro users.

It is said that while Ontario will no doubt ultimately be able to absorb all the power available for sale in Quebec, as well as that available for development in Ontario, the loss on all the power purchased from various sources—and not now needed—will shortly amount to a sum averaging from $7,000,000 to $10,000,000 per year.

Upward Turn in Weekly Energy Output



RISING by 1 per cent from the preceding week to 1,431,910,000 kw.-hr. in the week ended August 20 and thereby overshooting the two earlier figures this month, the energy output of central stations for light and power gained slightly also in comparison with 1931. It is still down 12.9 per cent from the corresponding week last year, but this contrasts favorably with the 13.1 per cent in the two other weeks of this month. It does not, however, indicate any striking change in conditions.

As announced by the National Electric Light Association a tendency to approach last year's production a little more closely is shown for all regions except the Pacific Coast. The Atlantic seaboard, previously off 10.1 per cent, changed this to 8.8; New England alone changed from 11.2 to 9.1 per cent.

Weekly Output, Millions of Kw.-Hr.

Week Ended	1932	1931	1930	1929
August 20	1,432	1,643	1,691	1,750
August 13	1,415	1,629	1,677	1,733
August 6	1,427	1,643	1,692	1,730
July 30	1,440	1,644	1,678	1,725
July 23	1,434	1,651	1,686	1,723

Per Cent Change from 1931

Region	Week Ended Aug. 20	Aug. 13	Aug. 6
Atlantic Seaboard	— 8.8	—10.1	— 9.0
New England alone	— 9.1	—11.2	—10.0
Central industrial	—16.3	—16.6	—16.6
Pacific Coast	—12.4	—11.9	—13.0
United States	—12.9	—13.1	—13.1

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Energy Use in Britain Continues to Rise

Electrical energy production in Great Britain, as reported to the British Electricity Commission, show that 806,000,000 kw.-hr. were generated during July, as compared with the revised figure of 785,000,000 kw.-hr. in the corresponding month of 1931. This is an increase of 2.6 per cent.

During the first seven months of 1932 up to the end of July the total amount of electricity generated by reporting authorities was 6,895,000,000 kw.-hr., as compared with the revised figure of 6,424,000,000 kw.-hr. for the corresponding period of 1931. This is an increase of 7.3 per cent, which compares with a 4½ per cent increase in 1931 and a 6 per cent increase in 1930 against the preceding years. As the domestic side of the business is expanding at a fairly steady rate, the inference is that the industrial use is now going ahead too.

The record figures in the United Kingdom are made the more remarkable at a time when in most other countries the output of current is either declining or remaining virtually stationary.

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Coast Association Issues Air-Conditioning Manual

To put the sales staff on a par with the engineering departments of the utilities with comprehensive data about air conditioning the general power bureau of Pacific Coast Electrical Association has just issued an air-conditioning manual of 114 pages. Describing briefly but adequately the requisite apparatus for the various systems, it follows with an analysis of the functions which air conditioning can perform for special industries, retail establishments, offices, commercial places, homes, etc. Typical installations are illustrated.

Pennsylvania to Operate Electrification in February

Inauguration of electric train service between New York and Philadelphia on the Pennsylvania Railroad will take place in February, according to present plans as outlined by M. W. Clement, vice-president in charge of operations. The greater part of the construction work has been completed, Mr. Clement points out, and instructions have been issued to push the task at all points between the two cities, with Februarv 1 as the date set for completion.

Some of the electric engines that will haul passenger trains between these two cities have been received. Fifty-two of them will be required for the through passenger trains between New York and Philadelphia, all of which, under the present working schedule, will have been received prior to February.

Construction work between Trenton and New Brunswick is described as being well under way and overhead wires are being erected rapidly. From Trenton westward to Philadelphia the work has been completed, trains having been electrically operated on that section since July 1, 1930.

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Oil Burner Business Totals $400,000,000 Yearly

During the past twelve years a billion dollars worth of oil-burning equipment has been sold and the present annual sales volume of fuel oil and equipment is $400,000,000, states Morgan J. Hammers, president of the American Oil Burner Association, who points out that such concerns as General Electric, Standard Oil of Indiana, Westinghouse, Standard Oil of New Jersey and General Motors have appreciated the potentialities of this new industry and are developing them intensively.

"The automatic heating of homes by oil," says Mr. Hammers, "has cast off its swaddling clothes. The industry has passed the pioneering stage and now enters an era of mass marketing. Less than 4 per cent of the homes in the United States have oil burners; ten years hence 20 per cent will enjoy the comfort and convenience and economy of automatic heating by oil."

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New York Metal Prices

	Aug. 16, 1932 Cents per Pound	Aug. 23, 1932 Cents per Pound
Copper, electrolytic	5.375	5.375
Lead, Am. S. & R. price	3.20	3.40
Antimony	5.00	5.25
Nickel ingot	35.00	35.00
Zinc, spot	3.10	3.10
Tin, Straits	23.20	23.00
Aluminum, 99 per cent	23.30	23.30

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Pennsylvania Water & Power to Expand Transmission

According to President C. E. F. Clarke, Pennsylvania Water & Power Company, "the management has concluded, that it is now advisable to proceed with its plan to secure added sources of income through extension to its high-tension transmission system."

Extensions to be made are a 110,000-volt line from Safe Harbor, Pa., to Perryville, Md., in connection with electrification work for the Pennsylvania Railroad, a 220,000-volt line to connect the company's regional transmission system with the system of the Potomac Electric Power Company and the construction of a second 220,000-volt line from Safe Harbor to Baltimore.

Major New Construction This Week

THREE STEEL TOWER transmission lines to cost over $400,000, with switching stations and auxiliary structures, authorized by Pennsylvania Water & Power Company.

Expansion and improvement program, with installation of new equipment, for power plant at Navy Yard, Portsmouth, N. H., by Bureau of Yards and Docks, Washington, D. C. Bids to be asked, $250,000 authorized.

Machine drives, motors and controls, power substation apparatus, conveyors, etc., to be installed in vulcanized fiber plant at Betzwood, Pa., by Taylor & Company, Inc. A $200,000 project.

Plans approved by Mountain States Power Company, Albany, Ore., for transmission line in vicinity of Flathead Lake, Mont., to cost about $35,000.

Electric tools, machine drives, motors and controls and other electrical equipment, with electric-operated machinery for coaling plant, will be installed in new engine and shop terminal at Yakima, Wash., by Northern Pacific Railroad Company. Estimated cost over $200,000.

Power substation equipment, motors and controls will be installed in gasoline refining plant at Baca, N. M., to be constructed by Transport Refining Company. Cost about $100,000.

Machine drives, motors and controls, regulators and transformers will be required for $200,000 radium refining plant at Port Hope, Ont., by Eldorado Gold Mines, Ltd.

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Exports of Electrical Equipment (Preliminary)

Article	June 1931	June 1932
Generators:		
Direct current	$108,942	$5,191
Alternating	8,135	9,832
Steam turbo-generator sets	9,575	3,286
Accessories and parts	131,373	38,630
Arc-welding sets	41,881	22,067
Self-contained lighting outfits	21,259	7,627
Batteries	386,946	245,987
Transforming or converting apparatus:		
Power transformers over 500 kva	12,557	13,886
Distribution transformers, 500 kva and less	24,719	15,614
Instrument transformers	45,137	4,420
Other transformers	54,395	16,169
Complete battery chargers non-rotating	3,733	1,949
Double current and motor generators, dynamotors synchronous and other converters	90,839	13,904
Transmission and distribution:		
Switchboards, circuit breakers over 10 amp. and fuses	478,680	66,945
Watt-hour and other measuring meters	47,122	25,204
Indicating and recording instruments	73,361	26,685
Other electrical testing apparatus	43,939	47,825
Lightning arresters, choke coils, reactors and parts	52,442	20,284
Motors, starters, etc:		
Fractional horsepower motors	$153,770	$56,956
Stationary motors	199,846	40,048
Railway motors	21,049	832
Electric locomotives	227,374	15,715
Electric motor trucks	38,168	5,290
Starting and controlling equipment	83,885	42,330
Portable electric tools	142,657	31,738
Accessories and parts	178,057	76,712
Electric refrigerators:		
Household	724,202	449,843
Commercial up to 1 ton	209,145	170,293
Parts	283,429	204,623
Electric appliances:		
Flashlight cases	44,138	19,585
Electric fans	51,698	21,479
Electromechanical health exercisers	1,694	349
Electric incandescent bulbs	68,890	36,617
Searchlights and floodlights	34,545	....
Electric household washing machines	68,743	17,356
Electric domestic vacuum cleaners	84,296	58,088
Other domestic motor driven devices except tools	41,930	15,011
Electric flatirons	21,016	22,942
Electric cooking ranges	84,900	12,367
Otherdomestic heating and cooking devices	40,667	18,144
Industrial electric furnaces, ovens and other heating devices	108,343	14,194
Therapeutic and X-ray apparatus	$108,101	$52,841
Signal and communication devices:		
Radio apparatus	1,581,140	925,903
Telegraph apparatus	29,694	4,187
Telephone apparatus	185,293	93,789
Bells, buzzers, annunciators and alarms	44,672	10,769
Other electric apparatus:		
Starting, lighting and ignition equipment	63,854	50,491
Insulating material	45,638	19,574
Miscellaneous wiring supplied	844,515	378,365
Electric porcelain	275,203	17,471
Carbons and electrodes:		
Electrodes for electric furnaces	88,447	68,765
Other carbon products	40,517	....
Carbon brushes and stock	....	6,203
Other carbon products	....	12,294
Insulated iron or steel wire and cable	8,616	1,274
Copper, bare, wire	41,535	10,959
Insulated copper wire and cable:		
Rubber-covered wire	22,952	30,020
Weatherproof wire	23,536	13,050
Telephone cable	21,344	1,744
Other insulated copper wire	159,361	35,184
Nickel-chrome electric resistance wire	10,153	25,726
Electric clocks	....	6,017
Totals	$8,142,054	$ 3,688,353
Six months ended June 30	$49,913,544	$26,273,336

Maryland Rates to Drop?

Harold E. West, chairman of the Maryland Public Service Commission, expects a downward revision of gas, electric and telephone rates in Maryland to follow as the result of a survey of the Consolidated Gas, Electric Light & Power Company of Baltimore, the Chesapeake & Potomac Telephone Company and virtually every other public utility in the state.

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Associated Insures 13,212

On June 1 of this year an improved employee insurance program became effective on the Associated Gas & Electric system. More than 90 per cent of the employees, 13,212 to be exact as of the present, are provided for in what is said to be the largest wholesale underwriting of ordinary life insurance to be attempted as a single undertaking. The protection consists of permanent life policies, each approximately equal to each employee's individual annual earnings.

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Appleton Hydro Celebration

Commemoration of the fiftieth anniversary of the first electric water power plant in the world will occur at Appleton, Wis., September 30. The celebration will be held under the auspices of the Wisconsin Utilities Association and the Wisconsin-Michigan Power Company, with the co-operation of the Wisconsin State Historical Society. A plant reproducing exactly the installation of 50 years ago is now being constructed and will be dedicated at the celebration.

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Current River Projects

Preliminary work on three hydro-electric power dams in the Ozarks region, to be built on Current River at a cost of $15,000,000 by the Current River Power Company, will soon be well under way, it is reported. The company now has a force of engineers at work running the levels on the river. Hargus Eddy, in Ripley County, will be the location of the first of the three dams to be constructed.

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Bricker Stays on Ohio Board

Commissioner John W. Bricker of the Ohio public utilities regulatory board, whose resignation was rejected recently by Governor White, has decided to remain until the Columbus Gas & Fuel Company case, now in dispute, is disposed of. Mr. Bricker said: "No one can prevent my resigning, but likewise no man who has assumed to perform a public duty and has heard the evidence and arguments, read and reread the briefs, as I have in this case, can refuse to give to his state any service which he is able to render."

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Home Cooling in Dallas

Increased use of home cooling appliances resulted in a gain of 8 per cent in residential consumption of electricity, while revenue from all other classes of service showed a loss as compared with the same month last year, the July report of the Dallas Power & Light Company shows.

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Business does not need stimulants; what it needs is freedom, opportunity, such a removal of barriers as will afford it even the bare probability of operating at a profit.

The lessons of the past clearly indicate that business men will gain that opportunity rather through the removal of the barriers that now blockade them than because of great governmental expenditures designed to stimulate business into such a pitch of activity as will overcome the barriers.

The only artificial stimulants that have ever been effective in this country in initiating recovery from depressions have been great wars.

LEONARD P. AYRES,
Vice-President
Cleveland Trust Company

[Colonel Ayres takes a look at a popular theory of economic recovery]

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Evanston Revamps Its Street Lighting

The first of 22 unit groups in the revised street-lighting system of Evanston, Ill., was placed in operation August 16. This first group contains 381 standards and covers 33 city blocks. The whole system, which covers an area of more than 7½ square miles, extends along 65 miles of streets and includes nearly 5,000 lighting posts, is graded both in candlepower and in height of the standards. In most residential sections the posts are fourteen feet high and the lamps of 250 candlepower. In some streets and boulevards the standards are sixteen feet high and the lights of 400 candlepower. The lights vary from 600 to 1,000 cp. in the business zones, with standards 18 to 20 ft. high. Fountain Square will boast the highest and brightest lights, with standards 22 ft. high supporting 1,000-cp. lamps.

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Ralston, Neb., Votes Power Bond

Ralston, Neb., has voted to issue $97,000 worth of warrants the proceeds of which are to be used in building a complete municipal plant. This is the first municipality in the state to take advantage of the law permitting this practice adopted by popular vote in 1930. The village is now supplied by the Nebraska Power Compny.

Denver Suburb to Vote on Plant

Englewood, Colorado, on September 2 will hold a special election, at which only property owners can vote and the question to be submitted is: Shall we issue $600,000 in bonds to pay for the proposed electric power and water system, the bonds to be paid from revenue obtained from the plants and not to be general obligation bonds? If approved the construction will be started by the Municipal Power Development Company of Minneapolis and condemnation proceedings started against the Colorado Central Power Company, its property to be purchased at a "reasonable figure." The plan contemplates the installation of three 500-kw. oil-engine-driven generators.

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French Quotas Exhausted

Import quotas for the third quarter of 1932 for imports into France from the United States of electric motors, industrial transformers, current rectifiers and radio tubes have been exhausted and no further imports of these products will be permitted, according to the Department of Commerce.

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Utility Sued for Lightning Damage

During a recent severe storm in St. Louis, Mo., lightning caused a fire at the plant of the Republic Bag Company, doing damage estimated at $25,000. This concern has filed suit for damages against the Laclede Power & Light Company charging that the company's power lines were negligently installed and that the utility failed to equip them with lightning arresters or other proper protective devices. It is alleged that the discharge of energy from the power lines within the plant caused the fire.

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Utility Valuations in Nebraska

The complaint recently filed in Nebraska with the state Board of Tax Assessment by Attorney-General Sorensen, in which the latter alleged that the larger power companies in the state, which he named, were being assessed on the basis of 65 per cent of their actual value, has been referred by the board to the state Tax Commissioner. He is instructed to investigate and report his findings to the board before December 1, within which time the board has legal power to order a reassessment or add omitted property. Governor Bryan told the press that the complaint was a form of political advertising for the Attorney-General, and spokesmen for the companies concerned say that they are assessed on the same basis as most property, farm lands being valued deliberately on a 60 per cent basis, although the law requires actual valuation as the basis.

Mercury Unit for Jersey Tested; Boiler Erected

Progress in the erection of the mercury vapor boiler and condenser for the Kearny station of Public Service Electric & Gas Company, New Jersey, is being made and it is expected that the equipment will be ready for preliminary operation about the first of the year.

Four of the seven mercury drums are now in position. These were assembled complete at the factory and shipped from the General Electric Works at Schenectady on specially equipped cars. To prevent rusting during transit and erection, the drums were sealed under slight pressure with hydrogen gas. The drums are entirely electrically welded and to avoid imperfections in the weld each seam is given an X-ray examination to determine the soundness.

A factory test of the mercury vapor turbo-generator was made on August 1 at Schenectady. In this the generator was operated as a motor driving the turbine at full speed to determine the satisfactory balancing of the turbine rotor. The generator is now being prepared for shipment to Kearny.

The steam resulting from the mercury unit will generate 35,000 kw. of electric power in addition to the 20,000 kw. produced by the mercury turbo-generator.

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Test Program Under Way on Non-Ferrous Metals

An elaborate and comprehensive test program for studying corrosion of non-ferrous metals and alloys is being carried out by committee B-3 of the American Society for Testing Materials, supported by many of the leading companies of the country. It has been estimated that over the past five years, during which extensive tests have been performed and preparations made for the unparalleled series of exposure tests now under way, these companies have contributed more than $175,000 in the form of materials, special testing equipment, labor and funds.

About 23,000 test specimens are being used in phases of the work. Of these, 13,000 are in the form of standard tension test specimens, each carefully machined and finished. The remaining 10,000 are in various forms depending on the type of test. The most extensive program is that sponsored by the subcommittee on atmospheric corrosion. These exposure tests will extend over a period of 25 years and involve the use of the greater part of the 23,000 specimens. Twenty-four different metals and alloys are being tested.

The amount of corrosion undergone by each metal and alloy is to be measured in two ways: (1) Determining the change in weight of plate specimens. (2) Determining the loss in strength and ductility by means of tension tests.

There are four plate specimens of each material exposed at each test location, two designated as "removable," two as "permanent." Thirty tension test specimens of each material under test are also exposed at each test location. In addition, an extra set of 30 tension test specimens of each material was prepared and placed in air-tight glass containers and stored at the U. S. Bureau of Standards.

As part of the general corrosion program of committee B-3, subcommittee VII on liquid corrosion is obtaining data and information on the resistance of representative metals to a few common solutions. The corrosion testing program of subcommittee VIII on galvanic and electrolytic corrosion includes outdoor exposure tests at nine locations of galvanic couples of the metals in common use and complete immersion couple tests of certain metals and alloys in hot water, brine, alkali and acid. Couple combinations of all of the following metals are being subjected to outdoor exposure: Aluminum, copper, mild steel, tin, zinc, nickel and lead.

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G. E. Busy on New Boilers

Production of boiler units for the new General Electric oil-burning furnace has been stepped up 100 per cent to meet sales program demands. All available electric welders have been recalled for this work. Many employees skilled on transformer welding have readily adapted themselves to the new work. The Pittsfield Works for many months has been operating on greatly reduced schedules. Already more than 200 men are employed on the furnace job, with prospects that more will be called back to work. Former employees are being hired.

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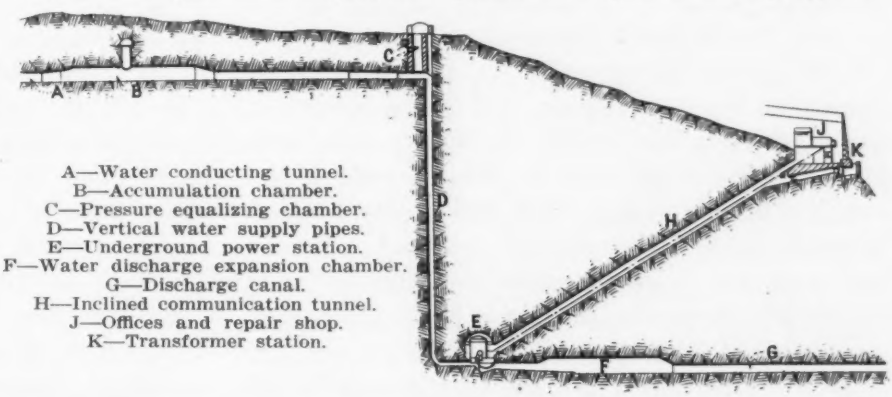
195,000-Kva. Station Built Underground

One of the most unusual electric power stations in the world, the new Brommat hydro-electric plant of the Société des Forces Motrices de la Truyère, in the south of France, is entirely underground, being located in passages driven in solid rock. It has a capacity of 195,000 kva. and is nearing completion.

Brommat is part of a 315,000-kva. development on the Truyère River, the balance being at the Sarrans station. Sarrans is intended to meet peak-load demands; in times of ample water supply it will be capable of supplying 120,000 kva. when working under a head of about 420 ft. Water used at Sarrans will be collected 1¼ miles below the station in the Cadene reservoir (storage capacity 132,000,000 gal.), whence the water passes to another reservoir at Bromme capable of storing from 37,400,000,000 to 44,000,000,000 gal. drawn from the Bromme River as well as from the Cadene reservoir. The two reservoirs are connected by a cement-lined tunnel about 4.8 miles in length cut through solid granite. From the Bromme reservoir the water again passes through a tunnel just over a mile in length, through two vertical penstocks to the subterranean power station at Brommat.

Brommat will form the main base of the undertaking. The turbine room necessitated an excavation in solid granite of a space measuring approximately 246 ft. in length, 72 ft. in width and 95 ft. in height. The position of the machine room also made it necessary to construct special tunnels for ventilation and installation purposes. The plant at Brommat consists of six main sets of 29,250-kw. vertical-shaft turbines and alternators working under a head of from 787 to 840 ft. Power is generated at 15,000 volts.

Generation at 15,000 volts was decided upon owing to the distance between the alternators and the transformers, the latter being located about 1,100 ft. from the tunnel outlet. Each generating set is connected to its own transformer to obviate the use of switch control gear of high rating.



A—Water conducting tunnel.
B—Accumulation chamber.
C—Pressure equalizing chamber.
D—Vertical water supply pipes.
E—Underground power station.
F—Water discharge expansion chamber.
G—Discharge canal.
H—Inclined communication tunnel.
J—Offices and repair shop.
K—Transformer station.

EDITORIALS

L.W.W.MORROW
Editor

Losses to utilities and public from political attacks

CROPPING out here and there in the utility industry is a tendency which will lead to more definite detrimental results than the statements which some politicians are conscientiously or maliciously attempting to broadcast. It is caused entirely by a reaction to the unjustified political attacks on the utility industry made by those who willfully warped available facts or inaccurately interpreted utility data. This tendency is a fear that any published data on the utility industry will be seized upon as ammunition for further attacks by enemies of the industry.

Let us cite three or four examples of this detrimental tendency for which we see such serious results:

One case involved the attempt to publish the experience of one company in reducing system losses—a worthy purpose and one possible of some very beneficial results. Another case dealt with experiences with the use of high-speed relays, which not only safeguarded human life but improved customer service. A third case had to do with experience and opinion on how interconnected operation should be conducted with the lowest over-all cost consistent with high-grade service. Finally, there were cost data on urban and rural distribution intended to guide the long study which must be made if lower costs are to be effected.

Each of these individual attempts to publish helpful information—information in which every company should have a vital interest—was unsuccessful. Not because the companies had anything to conceal, but because opponents of the utility industry have occasionally lifted statements of fact and twisted them into arguments against utilities.

As a result many utility companies are deprived of valuable information or obtain it only after considerable delay. There should be a common pool of experience and practice from which all can draw to help restore better economic conditions. Moreover, better public understanding of the industry is being handicapped by such action, to say nothing of the slowing up of load growth and better service standards. Fortunately only a few companies have taken this stand, so the cooperative action which has built the utility industry is not seriously affected yet. Any increase in this tendency, however, is not constructive or conducive to the development of good internal and external relations.

Why some rise and others fall

THERE are some persons in all ranks of this and every other industry who think their policies and practices cannot be improved. How ridiculous. Any one who has a country-wide opportunity to observe the progress of individuals and companies can readily testify that those which are open-minded to new ideas and practices, which continuously and aggressively seek such information, stand in the front ranks of individuals or companies making the most progress in improving conditions for their employers, stockholders or customers and in consistently increasing their income. They suffer less from the conditions of the last two and one half years and occasionally make others marvel because they or their companies are earning as much as or more than during the so-called boom periods.

In conversing with the successful executives or rapidly progressing department heads and staff members it is a common thing to hear them declare with conviction that they devote a portion of their time to searching for better policies and practices among other companies and in other industries. Some emphatically declare that any one who cannot find time to do so is a poor or-

ganizer of his time or of those who report to him and does not deserve to progress. When they can't travel to enlarge their viewpoint, and even when they can, they consistently read about policies and practices of other companies to ascertain how they can improve their methods. An open mind and new information are fundamental to success in this rapidly changing period.

Rationalize fuse ratings

IT IS indeed remarkable that less knowledge is available about the humble fuse, the oldest and simplest of all electric protective devices, than about the most elaborate breaker and the most complicated relay. Nor has any one ever established any definite rule which would serve as a guide to decide when a fuse is sufficient and when a breaker must be used. With the exception of cases where control and relay problems determine the use of breakers the engineer usually resorts to a fuse because he cannot justify the greater expense of providing a breaker.

After many years of experiments and hot discussions we now have some generally accepted ratings for breakers. But in the fuse field there seems to be very little definiteness, very little standardization, very little rationalization, and the lack of definite, standard ratings always leaves the field open to unfair and unscrupulous competition. To be sure, it cannot be expected that the same certainty of rating ever will be established in relation to fuses as now exists in relation to breakers and relays. The inherent characteristics of the fuse cause a great amount of indefiniteness, and this is probably the main reason why it cannot wholly take the place of the breaker.

But there are features that can and should be rationalized, such as the time element in relation to the overload current, the influence of the ambient temperature and the mechanical strength. It is as yet impossible to state whether or not it will be possible to establish a single time-current rating for each fuse; perhaps it will always be necessary to establish the rating in the form of a curve. But there is certainly a sufficient amount of confusion and misunderstanding to call for a get-together on the part of all manufacturers and to attempt to establish more definite and more generally understood ratings than exist today.

Must the electric range just say "Me too!"

TO THOSE who believe that domestic cooking offers a market worth winning for the electrical industry the progress of the two announced national campaigns by the manufacturers of ranges—gas vs. electric—brings small comfort. The last news of the electric cookery council was that $50,000 had been pledged by the manufacturers of electric ranges to be spent in the year ending next summer, with a prospect of perhaps $75,000, based on a contribution of one dollar per range sold.

This money, which would be totally inadequate for any national advertising campaign, will be spent in preparatory field work and education within the industry, to get ready for an appeal to the public later on. This preparation is necessary, for there are many obstacles to be removed from the minds of electrical men before a united support for the electric range can be expected. Many combination companies oppose them. Contractors, dealers and wholesalers must be convinced that the plan offers them a permanent place in range distribution that will be profitable.

Meanwhile, however, comes the announcement that gas range manufacturers, representing 90 per cent of that industry's capacity, have pledged 5 per cent of current net billings, which it is expected will provide a million dollars this year for a national campaign to start in February to sell gas cooking to the American kitchen. It will be supported by new models, with clock control, automatic lighting, appealing designs and lower prices. All of which is good, because it will further public interest in better cooking methods and more efficient ranges and the advantages of the electric range will find their place. But the gas range campaign, that was organized to meet the threat of the announced campaign for the electric range, now apparently takes the lead and will strut in the sunlight of public interest, while the electric cooking program, delayed and whittled down to impotence, seems destined to play the part of the small voice calling "Me too!"

Residence business has certainly demonstrated its worth to the electrical industry in the past three years, with little cooking load. Is this great market to be sacrificed for lack of courage?

Foundations Laid for Business Recovery

The wave of confidence which has swelled from small beginnings in July until it now permeates business news is no mere manifestation of psychological or temperamental caprice. That actually this optimism is well founded may be seen from this résumé of the administration program, prepared by Virgil Jordan, economist of the McGraw-Hill company.

Understanding the background is all that is necessary to sense that the way has been paved, smoothly and durably, for business revival. Next there must be the will to utilize the favorable agencies now available. Dr. Jordan indicates what business must do to translate current optimism into rising indices of trade.

FUNDAMENTAL changes have taken place in the financial situation which, for the first time in two years, make real business improvement possible and favor the success of the efforts of the government. The persistent scepticism and inertia of business attitude remain at present the most important obstacles to such success because, from this point on, it depends principally upon the support of business opinion and the revival of private business initiative.

From the beginning the essential objective of the Administration's program has been to support and stimulate private enterprise by protecting or creating the conditions necessary to encourage it. Seen in retrospect, the successive steps have constituted a consistent scheme of action which can now be interpreted somewhat as follows:

1. The immediate problem, following the stock market collapse in the fall of 1929, was to prevent a financial panic, stabilize business sentiment and avert a too-drastic decline of commodity prices, curtailment of employment and consumer-purchasing power and contraction of business activity. This was attempted by direct methods involving the following lines of action:

(a) With the assistance of the Reserve banks, through large open market purchases of government securities, the member banks were able successfully to take over the private foreign and domestic call loans on securities. In this way and through direct liquidation of securities an enormous volume of corporation reserve and individual investment funds was released.

(b) Leading corporations, especially in the railroad and utility fields, were urged in conferences with the President to use these reserves and to employ the released individual investment funds through new security issues to carry on their maintenance and expansion programs, thereby helping to maintain employment in the capital goods and other industries.

(c) Investment funds were drawn upon by large public borrowing to advance public works as a means of maintaining employment, and also to check the decline in commodity prices through Farm Board stabilization operations.

(d) The maintenance of wage scales was urged by the President in conferences with industrial leaders as a means of supporting consumer-purchasing power.

These efforts were successful in temporarily checking the decline and producing a rising trend of business activity, commodity prices and employment from the beginning to the middle of 1930. New security flotations were large, investments of the large city member banks expanded rapidly, construction activity increased, employment and wages were fairly well maintained and the general level of business volume returned nearly to the long-range normal by July, 1930.

But beneath the surface a process of credit contraction, particularly in commercial and security loans, and a competitive scramble for gold had set in on an international scale during the summer, resulting in a steady and rapid decline of security and commodity prices. The deflationary effect of this process was accelerated in a vicious spiral up to the summer of 1931, when the international financial panic phase of the depression set in. The large-scale liquidation of foreign loans and credits, the recall of capital and the increasing difficulty of making foreign payments as international trade and commodity prices declined brought on a series of debt defaults and political disturbances in foreign countries culminating in the collapse of the Credit-Anstalt bank in Austria, the financial breakdown of Germany, the flight of foreign funds from London and the abandonment of the gold standard by Britain, in the period from the end of April to the end of September, 1931.

Banks protected against international panic

2. The problem precipitated by these developments was primarily one of protecting the domestic banking structure, which must serve as the basis for any business recovery, from the far-reaching effects of the international financial panic resulting from these events. The successive steps taken for this purpose were:

(a) The President's proposal made at the beginning of June, 1931, of a moratorium on reparations and war-debt payments temporarily removed an enormous financial strain from Europe and helped to lift the deflationary pressure of impossible international payments from the world commodity and security markets. In spite of this relief, so large a volume of foreign credits was frozen in central Europe, especially through British loans, that confidence in the stability of the pound was disturbed and the flight of capital from London forced England off gold.

(b) Efforts were made to avoid this through Federal Reserve credits extended to the Bank of England and to the Reichsbank, but they were unsuccessful in stemming the panic. The collapse of sterling was a terrific shock to financial confidence the world over and speeded the contraction of bank credit, the liquidation of security loans and the decline of security and commodity prices in this country. Domestic confidence was so disturbed that currency hoarding started on a large scale, causing a rapid increase in bank failures, paralyzing the credit structure and bringing the capital markets to a complete standstill.

(c) Private co-operation of the stronger banks was enlisted to support the weaker banks by pooling resources through establishment of the National Credit Corporation on initiative of the President. This device proved not strong or prompt enough in operation to check bank closings and stop hoarding. Moreover, the decline in railroad traffic and in railway security values so undermined the credit position of the railroads as to menace not only the security of the commercial banks but of insurance companies, savings banks and other financial institutions which were large investors in railroad securities. It became necessary to broaden the support of the financial structure and to employ public as well as private credit agencies for the purpose.

(d) The Reconstruction Finance Corporation was established to prevent bank suspensions, railroad receiverships, strengthen insurance and mortgage bond companies and savings banks by loans from public funds. The essential purpose of this use of the public credit was to restore confidence of depositors, check hoarding of currency, prevent further depression of security and commodity prices by averting distress liquidation of loans and investments of banks and other financial institutions.

Glass-Steagall act thwarts hoarding and foreign gold raids

These measures were fairly successful so far as strengthening the confidence of domestic bank depositors and investors was concerned. The rate of bank suspensions and the increase in currency in circulation were checked by the end of February, 1932. But then the further influence of foreign factors began to be felt in full force. The large increases in government borrowing implied in these measures for use of public credit to support the banking structure, the seriously unbalanced condition of the federal budget, the agitation for further large public expenditures for employment relief, public construction, or bonus payments, the difficulties of framing an effective revenue measure, and the discussion of suggestions for direct or indirect currency inflation in Congress, all combined to create foreign fears for the stability of the dollar and the maintenance of the gold standard in this country. Foreign banks began to withdraw their gold balances on a large scale, a flight of American and foreign capital from the United States and an active speculation against the dollar set in early in the year when domestic hoarding was still conspicuous.

(e) To meet this additional danger the Glass-Steagall act was passed, protecting our banking system against the deflationary effects of foreign gold withdrawals and domestic hoarding by permitting the use of government bonds instead of commercial paper as a backing for currency and extending, in emergency, the powers of the Reserve Banks to assist member banks by rediscounting paper theretofore ineligible. The effect of this was to release an enormous amount of gold for export without compelling further contraction of credit and liquidation of loans and investments by member banks. The danger of any departure from the gold standard was definitely removed, foreign gold demands were freely met, foreign confidence in the stability of the dollar was re-established and the speculative attack on it ceased.

(f) Passage of a drastic revenue measure and some curtailment of federal expenditures under determined Administration pressure which pledged a provisionally balanced budget was the final step in this process of repelling the attack on the dollar and preventing collapse of confidence in the currency which were undermining the banking and credit structure of the country. Insistence of the Administration upon balancing the budget and opposition to a large program of public borrowing for any purpose which would not provide a self-sustaining basis for the expenditure were indispensable parts of this campaign to protect the credit structure.

The significance of all this strategy was not as fully understood at the time as it is now, but it has been completely successful in its purpose. The final international-panic phase of the depression due to fear of the soundness of the dollar has definitely passed. Confidence of foreign investors in American securities and the safety of our banking system and the stability of our currency has been re-established; gold began to flow back to this country in the middle of June of this year, and the bond market has risen steadily under the initial influence of foreign buying. These favorable developments are the fundamental factors in the reversal of business and financial sentiment which has taken place in the past month. They were, fortunately, further supported by the write-off of reparations at the Lausanne Conference in the middle of July and the successful British war-loan conversion operation, both of which removed more of the deflationary pressure on world money and commodity markets.

Positive measures have now replaced defensive tactics

3. When the protective weapons against panic had been provided by the preceding steps in its program the Administration first found it possible to pass on to more positive steps to promote credit expansion and stimulate business enterprise.

(a) The large-scale open-market purchases of government securities by the Reserve banks, beginning at the outset of March, 1932, had the purpose of offsetting foreign gold withdrawals and building up the reserves of member banks to the point where the banks might be expected to be prompted to expand their own loans and investments. The deflationary effects of these operations were partly offset by the outflow of gold up to the middle of June, and financial confidence was still disturbed by the continuing congressional session. No definite expansion of member bank credit resulted, but the decline was checked in the larger city banks, stock prices reached their bottom June 1 and remained stabilized at that level during the next month and a half, while commodity prices started to rise slowly and steadily thereafter. To speed the process more direct methods were used.

(b) The American Securities Investing Corporation, or bond pool, was formed at the instance of the Administration to support the bond market, and the recovery in bond prices has continued rapidly with few interruptions since it started on June 1. This support attracted foreign investment interest, which has maintained the upward movement since and tended to favor revival of new capital issues.

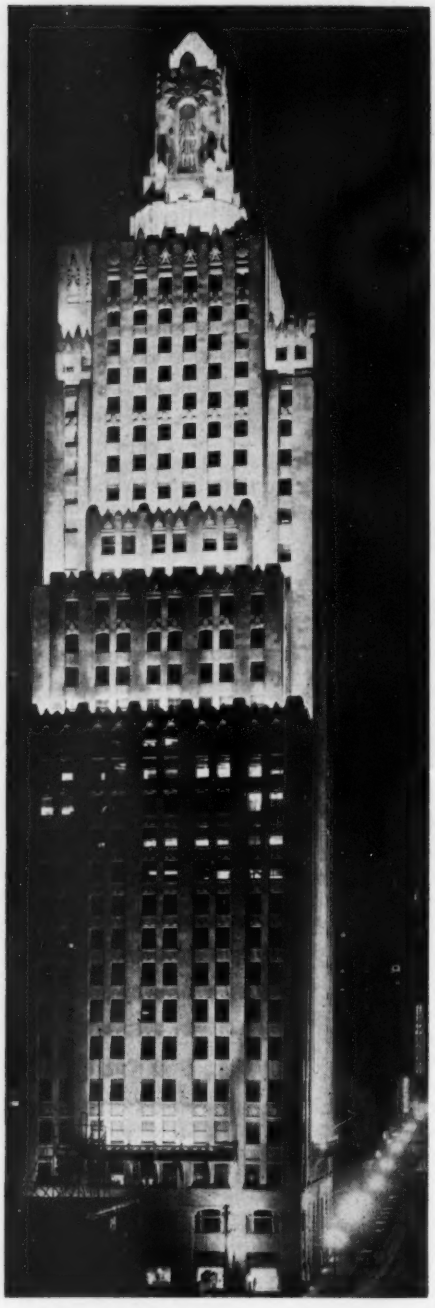
(c) The emergency relief and construction act, framed along lines largely determined by the Administration, together with the home loan bank act, includes among purely protective provisions for unemployment relief and prevention of distress liquidation of real estate and farm products the first positive measures taken by Congress to stimulate industrial activity and employment.

(d) Committees of bankers and industrials were established in all important Reserve districts to co-operate with the Reserve Banks in investigating the possible avenues of credit expansion, serve as a clearing house for proposals by which member bank and R.F.C. credit resources could be more effectively put to work, and to put pressure upon the banks to apply more liberal lending policies. Out of this has grown the campaign for extending use of trade acceptances and other concrete projects for improving local credit conditions.

(e) A special aspect of this effort now under way is the organization of a private co-operative pool arrangement among banks to stimulate and provide credit to business concerns for the replenishment of their normal stocks of raw materials. The essential intention of this will be to shift the large stocks of commodities now in the hands of producers or weaker holders to those of stronger holders with good credit support, thus taking them out of the show window where they depress the market, removing the danger of further distress liquidation of them and stimulating speculative interests to resume their normal function of carrying them. Its importance consists in the possibility of checking the excessive deflation of commodity prices and improving the position of the farmer and raw material producer.

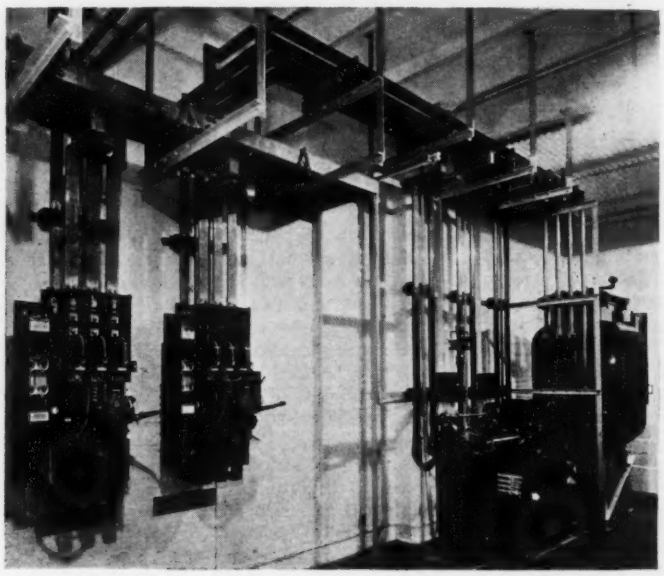
(f) The final step in the Administration's program, now under consideration by a subcommittee of the unofficial national organization, headed by A. W. Robertson of Westinghouse, is to stimulate employment in the industries producing machinery and equipment through a national drive for the modernization of industrial facilities. The decline in employment in the capital goods industries is the most serious aspect of the unemployment problem. A large back-log of need and demand for more modern equipment exists throughout industry, and the replacement of obsolete equipment may play a most important part in business recovery. The essential strategy of this campaign will be, first, to assure credit facilities for the purchase of equipment, either by finding some way to support them under the powers of the R.F.C. or by stimulating the securities market sufficiently to speed the flotation of new capital issues, and, second, to enlist the self-interest of both buyers and sellers of equipment in a modernization program through the local banking and industrial committees and the business press.

Utility Building Features Newest in Electrical Design



By T. G. HIERONYMUS
Kansas City Power & Light Company, Kansas City, Mo.

Secondary network supplied from two substations, a different method of supporting cable risers, mobile color floodlighting and numerous interdepartmental services electrically operated make the recently occupied new building of the Kansas City Power & Light Company stand out as a conspicuous example of modernity.



Sub-basement substation

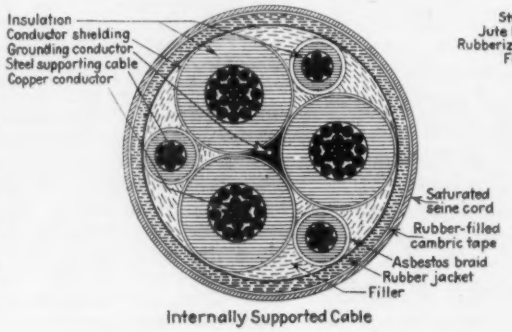
A 1,600-amp. network breaker and a 300-kva., 13,200/115-199-volt transformer regulated by three gang-operated, single-phase, 5 per cent induction regulators make up each bank. Each substation contains two such installations.

Improved vertical cable

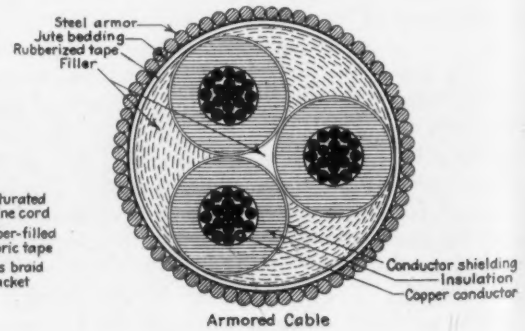
Three 13,200-volt, three-conductor, No. 3/0 cables suspended at the fourteenth floor (two operating and one spare) supply energy to the fifteenth floor substation. One of these is the conventional wire-armored submarine type, but the two others are of special design. Three steel support cables are imbedded in the filler spaces. Each is protected from short-circuit current with rubber insulation and asbestos braid and insulated from ground at each end. Current from phase to neutral faults is taken care of by the No. 2 stranded copper in the center space. The entire cable is assembled with a ¼-in. rubber jacket and a seine twine braid. The insulation on both types of cable is rubber compound shielded with three-mil copper tape.

Night visibility

The exterior is lighted by 428 floodlights with a total connected load of 360 kw. and a demand of 300 kw. The intensity at the bottom is 8 foot-candles and at the top 30 foot-candles. The dome is lighted by six 1,000-watt floods. The tower below the dome is lighted with 172 floods that produce mobile colors of green, amber, white, and ruby. The four crystal windows in the tower are colored by twenty 500-watt floods. At all times during darkness when the floodlights are off the dome is lighted by red neon. The building is a welcoming beacon for aviators and can be seen 50 miles away.

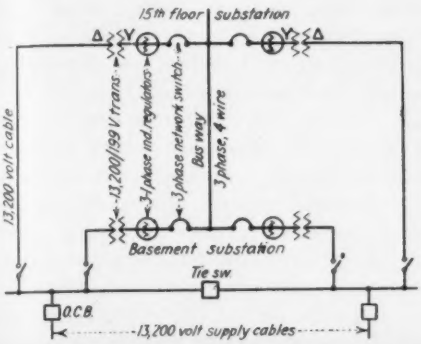


Internally Supported Cable

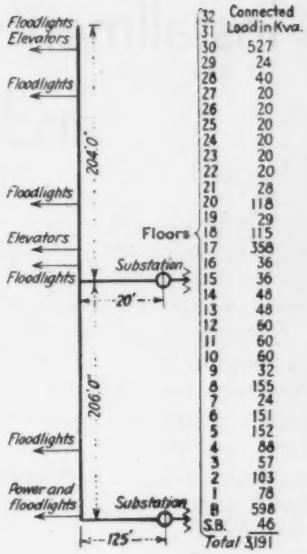


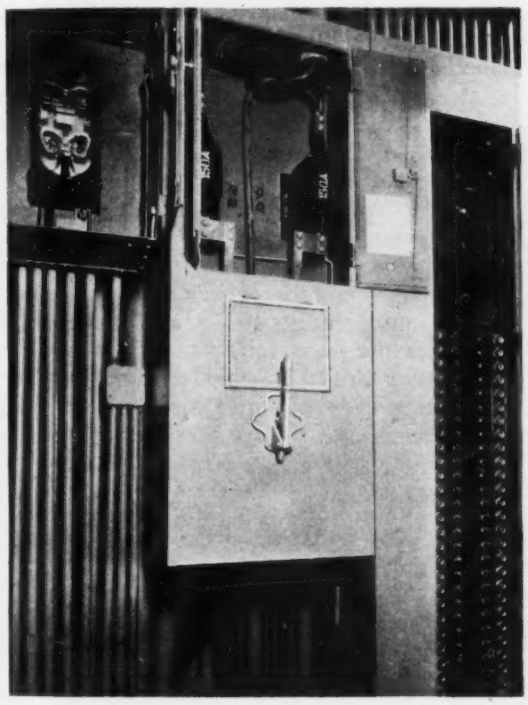
Armored Cable

The building is supplied by two 13,200-volt, three-phase unregulated circuits. Normally one transformer bank in each substation is supplied by each cable, but provision is made so that all banks may be supplied from either cable. The total connected load is 3,191 kva. The maximum and minimum demands so far have been 850 kva. and 300 kva. The expected maximum demand will be 1,000 kva. when the cooling system is operating at its peak during the summer.



Electricity supply scheme



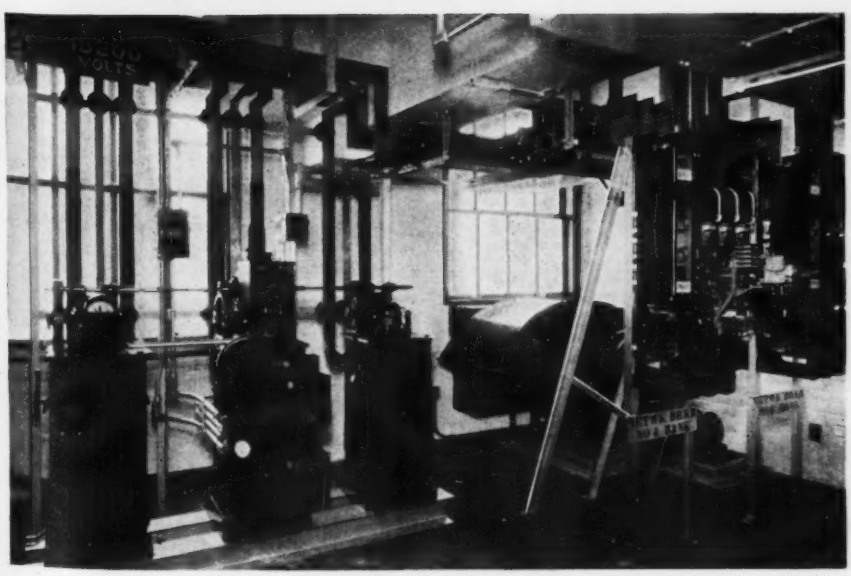


Vertical distribution

An inclosed busway runs vertically throughout the building. At each floor a connection is made for distribution on that floor. The busway has a capacity of 2,000 amp. and is made of ¼x4-in. copper for the three phases and ¼x4 in. and ¼x4 in. for the neutral. The busway is transposed at proper points for best regulation. The maximum variation is four volts at any point. The average is two volts.

Upper-floor substation

The fifteenth floor substation is the same as the sub-basement substation except for the amount of headroom required for the primary switches, etc. Note the mechanically connected regulators and one contact-making voltmeter for the bank.



New design vertical cable support

The conventional wire-armored submarine type cable is supported by a special armor clamp that rests on the conduit. The special type cable is supported from above by turnbuckles connecting to an equalizer ring. Insulators are placed in the supporting steel cables to minimize the possibility of fault current burning the supports in two. Any one of the three steel cables will support the entire weight.

Reverts on Installments and Aggressive Sales

GOSSIP has been going around that there has not only been a shrinkage in volume of merchandise sales but an increase in reverts from installment sales or repossession. It has been disturbing some conservative utility men about the wisdom of continuing aggressive merchandising under present general conditions.

To secure some facts on the situation a check test has been made of three sections of the United States and ten reports received so far are presented. Other reports are expected as the survey is being extended. It should be observed that the first six reports are for the far Western states, the next three for the Middle West and the last for the Atlantic Coast states, so this preliminary report is not necessarily representative of the situation which a more complete survey will disclose, but it does present the far West situation quite thoroughly.

The reports indicate what might be expected—that merchandise sales for the recent twelve months, both in units and dollars, are lower than the sales in the corresponding twelve months ended 1929, the sales being 12.5—91 per cent of that period—averaging 54 per cent for units sold and 57 per cent for dollar merchandise revenue. Companies B and D_1 report the highest maintenance of business, so far as number of units sold, whereas companies I and D_2 report the best maintenance of merchandise revenue compared with 1929.

One explanation of the wide divergence can be attributed to economic conditions. There are instances where sales departments have not escaped management's zeal for curtailment. The result has been drastic reductions in sales forces and retrenchment in advertising and sales budgets. Dealer agitation against utility merchandising has led to unwarranted concessions which have further reduced sales volume. Under the circumstances horrible examples of once progressive companies which have to all intents and purposes almost completely ceased load-building activities are not hard to find. Faced by equally bad or worse economic conditions, other companies have not quit fighting, but are getting new business every day.

Experiences of companies reporting in this survey blast the alibis that "all of the time of the commercial departments must be devoted to retention of existing business and that if active merchandising was pursued reverts would exceed the number of new appliances sold."

Where companies have left popular-merchandise sales to dealers, as the footnotes indicate for companies A, B, D and F, this can partly account for the reduction in merchandise business. However, broad dealer co-operation, as distinguished from total relinquishment of merchandise sales, may increase the energy revenue from total appliances connected.

Except for company B (which reports more business done in a recent twelvemonths period than in the corresponding period ended during 1931), all the companies tabulated show a further reduction from 1931 business—the sales representing 46 to 101 per cent of the units sold in 1931 and 40 to 112 per cent of the income, averaging 65 per cent in both cases.

Company		A	B	C	D_1	D_2	F			G	H	I	J	
							Ranges	Refrigerators	Water Heaters					
Merchandise Sales (index) in corresponding 12 mos. ended during														
Units	1929	100	100	100	100	100	100	100	100	100	100	100	100	A—F inclusive Western States
	1931	81	83	88.8	112 (80.5)	91.2*				111	62.3*	103*	81*	
	1932	51	84	48.6	73.4(43.2)	42*	41.5	71.3	12.5	64.1	43*	67*	51*	
Dollars	1929	100	100	100	100	100	100	100	100	100	100	100	100	G — I inclusive Middle West
	1931	100	45.5	89.8	122(90)	127				118.5	86	144	81.8	
	1932	49	51	36	61.2(40.7)	80	41.2	64	16.8	73.7	68	91	54	J — Atlantic Coast
Reverts (% of year's sales) in corresponding 12 mos. ended during														
Units	1929	2	B				Very small							
	1931	2.5	B	10.2			12.3	12.3	18					
	1932	4	B	16.6			33.2	18.2	75					
Dollars	1929	2½	B	9.4	0.06	3.9					2.2	3.5	2.5	
	1931	2.6	B	14.0	0.09	2.9					2.1	2.9	3.0	
	1932	5	B	26.5	16	4.6					1.5	3.7	3.9	
Energy Revenue (index) from new merchandise sold in corresponding 12 mos. ended during														
	1929	100	100	100	100	100	100	100	100	100	100	100	100	
	1931	76	83.2	133	96.5(88.8)	110*				77.1	102.5*	132*	72*	
	1932	55	84	55.8	40.7(38.3)	64*	41.5	71.3	12.5	45.8	79*	90*	57*	

A — Affected by establishment of broad dealer co-operation.

B — Reverts were very small because company merchandises only heavy-duty domestic appliances such as water heaters, ranges and air heaters, which require special wiring. Any purchaser who makes investment in wiring seldom fails to go through with purchase of appliance.

D — Sale of small appliances discontinued in 1931, so figures are given for major appliances (ranges, refrigerators, water heaters, washers and ironers). Figures in parentheses include all appliances, but give a distorted picture because of change in policy in 1931.

* For five months ended May 31; all other figures for twelve months ended May 31.

F — Includes only ranges, refrigerators and water heaters for twelve months ended June, 1929 and 1932. Total sales of all appliances decreased in twelve months ended June, 1932, 54.5 per cent from same period 1929. Reverts based on 1931 experience and first six months 1932.

It should be observed, however, that, excepting company B (which did 12 per cent more business than in 1931), the Middle West and Eastern companies have apparently maintained a higher percentage of the 1931 sales volume than the far West companies. Possibly the experience that the Western states have usually been the last to feel depression and that the Eastern companies are the first to recover is being demonstrated again.

One Western company reports that range sales are off 57 per cent, refrigerator sales off 40 per cent, water heater sales off 14 per cent in number, but they are up in value. However, it has sold a good volume of merchandise since the first of the year, including over 1,000 ranges, 700 water heaters and 400 refrigerators. A higher percentage of its sales has been for cash than in previous years. Dealer sales are three times that of the utility in dollar value and equal in load-building value on a kilowatt basis. Last year this company sold over 6,000 "big-three" units, consisting of ranges, water heaters and refrigerators. Starting in this year with an average of 35 a week, it has increased its average to 88 and hopes to reach 100 by the end of the year, or a total of 5,200 units. To date this company's purchases of these items have been small as it has been selling from stock and reducing inventory. However, it will be caught up in the next few months and then purchases will keep pace with sales. Dealer relations are good and a power company representative sees every dealer in the territory at least once a month. All merchandise except ranges is sold at list and these are now being sold at the l.c.l. price, ———, plus 33½ per cent, which is an increase of about 3 per cent. All merchandise under $25 is sold for cash only.

Reverts on installment sales, which were the chief subject of this investigation, show wide differences. In per cent of value of merchandise sold six of the companies do not show a great increase in repossession, and company H has experienced less necessity for repossession apparently due to more careful credit scrutiny. But companies C, D_1 and F show an alarmingly high percentage of reverts—26.5, and 16 to 18.2, and 75 per cent respectively. Possibly it is due to a let-down in sales volume in the case of companies C and F, but that can hardly be said of company D_1, which has maintained 73 per cent of its 1929 sales volume. Lax credit scrutiny is more likely accountable.

From this preliminary report it does not seem justified to conclude that reverts are running higher enough to discontinue aggressive sales effort. The contrary seems to be true, but customer credit must be much more carefully investigated and a selected market approached. It is interesting to observe the footnote comment from company B on the reason for low reverts.

Energy revenue from new merchandise sold in general follows the number of units sold, so the comments already made on the latter, coupled with a study of the tabulated estimates, cover this subject sufficiently. These figures do not include the energy revenue from merchandise sold by dealers and hence cannot be expected to agree with experience with domestic revenue as a whole, which has held up and even increased throughout most of the country.

In view of this check survey of reverts it appears that the gossip which has started some unjustified conclusions regarding the value of merchandising now is liable to do more harm than good. The saner conclusion is to merchandise aggressively, co-operate with dealers, but give more attention to the credit standing of customers.

▼ ▼ ▼

Industries Quiet in South and West

Changes in industrial conditions during July in the South and West were moderate, according to reports received by the ELECTRICAL WORLD on the consumption of energy in the various branches of manufacturing. In the first-named region activity increased about 3 per cent compared with June; in the West it declined 2 per cent. The latter compares favorably, however, with the 4 or 5 per cent decrease in each of the three preceding years. In both sections operations continue slower, on the whole, than a year ago, 23 per cent in the South and 14 per cent in the West.

Food products, being definitely a form of "consumer" goods, maintained a steady rate or moved seasonally upward—depending on the section of the country—and continue fairly close to the rate in other years.

As elsewhere, rubber products receded after the extraordinary spurt in June. In the South iron and steel gained vigorously after two exceedingly low months, but that industry still remains 47 per cent lower than a year ago. Textiles declined, but operations are less far below last year's than in New England.

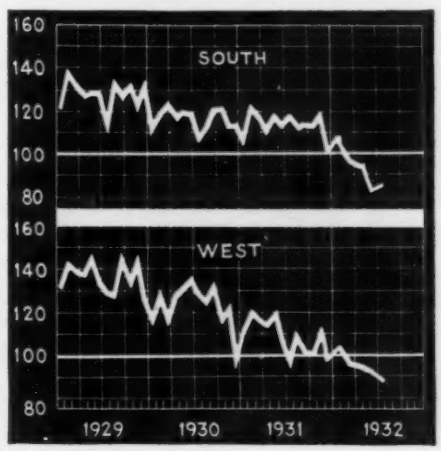
In the West a pronounced slide in the extremely depressed metals group accounts in large measure for the decrease in the regional average for "all industry." Reductions in other branches were generally small.

Indices of Industrial Activity in South and West

Base: Average Month, 1923-1925 = 100

	South					West				
Industrial Groups....	July, 1932	June, 1932	May, 1932	April, 1932	July, 1931	July, 1932	June, 1932	May, 1932	April, 1932	July, 1931
All industry	**86.0**	**83.7***	**90.3**	**89.7**	**117.5**	**89.2**	**91.5**	**94.3**	**96.2**	**104.0**
Chemicals	122.2	124.8*	130.2	117.0	147.2	88.7	85.2*	90.1	82.7	87.8
Food	157.5	144.8*	153.4	127.8	173.4	112.0	112.4*	115.3	114.8	135.3
Iron and steel	75.3	60.7	64.8	76.0	142.0	.....	.....	.....	.....	.....
Metal working plants	61.3	59.2	64.6	59.8	80.4	.....	.....	.....	.....	.....
Metals group	69.2	60.1	64.7	69.0	114.8	31.8	43.8*	36.2	38.0	47.8
Forest products	31.6	29.7	37.6	44.5	79.3	103.8	106.3*	117.0	128.0	126.0
Paper and pulp	120.4	117.5	126.0	134.1	140.0	120.5	128.7	143.0	134.0	135.1*
Rubber products	104.5	168.8*	83.8	64.3	111.0	103.0	132.0	100.7	99.0	146.0
Shipbuilding	.....	.....	.....	.....	.....	102.9	105.0	102.5	100.7	77.8
Stone, clay and glass	112.8	110.0*	124.0	148.9	154.0	79.2	72.0	79.1	96.6	115.5
Textiles	70.2	75.2*	77.5	85.6	93.0	.....	.....	.....	.....	.....

*Revision.



Saving Time and Expense in Underground Work

Stadler photo

Guide clamped to crossbeam-lever for thrust

SOME new methods of saving time or expense, or both, in handling underground construction and maintenance were demonstrated before about 30 representatives of utility companies in the vicinity of New York recently by the Boring & Drilling Corporation of New York. The operations demonstrated included removing massive obstructions from underground cable ducts, enlarging ducts to accommodate larger cables and boring horizontal runs for ducts.

While the removal of concrete obstructions in ducts created considerable interest, most of the utility men present expressed the opinion that the methods employed would find greatest application in simultaneously rodding and threading ducts, installing ducts where it is impractical or uneconomical to excavate and removing mud or silt from ducts which have been flooded. It was reported that at least 25,000 ft. of duct can be rodded and threaded in an eight-hour day using a rotary brush head. However, it was recognized that concrete and other obstructions occasionally occur in ducts which are very costly to remove by excavation, and which could be removed quickly by the method shown. Where conditions permit, it may occasionally be desirable to enlarge ducts by the method shown, especially if other routes are not available for the extra cable capacity needed, some utility men admitted.

The tool used consists of a cylindrical air motor about 14 in. long which will fit in the duct with a small clearance, to the head of which may be fastened a boring or reaming tool, wire brush or carborundum wheel, running at 5,000 to 10,000 r.p.m. The motor is attached to the air line from any suitable capacity compressor by articulated steel tubes (3 to 5 ft. long), joined together by special air-tight joints that can be quickly connected or disconnected.

The dimensions of the head and the construction of the articulated tube are such that the tool will follow curved ducts without injuring the inclosure. With the accessories it can also be used to bore a straight hole without appreciable deviation from the line selected.

Three 4-in. round tile ducts 18 in. long and plugged with concrete (1:3:5 mixture set 48 hours) were bored out with a combination boring and reaming head in 25 to 30 seconds each.

A 10-ft. run of six concrete-incased 4-in. fiber ducts, each containing two 9-in. concrete obstructions, was bored out at the rate of one duct every 48 seconds or 0.375 in. of solid concrete per second. In one test, made to show the possibility of enlarging ducts $\frac{1}{8}$ in. radial thickness of the fiber duct was removed in addition to the concrete obstructions at the rate of one 10-ft. duct every $9\frac{1}{2}$ minutes. A high-speed crucible-steel boring head was used, connected to a 140-cu.ft. per minute air compressor, but this capacity is needed only when boring through solid concrete. It was reported that a "Stellite" boring head would increase the life of the head about seven times. Two men were used to do the job; no jacks are required to obtain the necessary pressure.

The announcement was made that 500-ft. oval monolithic duct which had been in service eleven years was enlarged from 4 in. to 5 in. for a local utility company. As an indication of the ability of the tool to follow an arc it was reported that a 45-deg. curve in a duct line 500 ft. long was negotiated in some work done for a New York subway construction company.

Another demonstration involved boring out a 10-ft. run of 4-in. multiple-tile square ducts, several of which contained one 6-in. solid concrete obstruction each; another was filled with dry sand, and a third with wet sand.

The concrete obstructions were removed in 25 to 30 seconds each, only two operators being required. After

Stadler photo

Air motor drives boring tool, reamer, brush or carborundum head as desired

boring out the concrete a small shoulder was left in each corner of the square tile duct, which would not obstruct the usual size cable. But if it were feared that these shoulders would cause trouble or become loose they can be removed with the same motor, using a drill, wire brush or carborundum head, it was declared. Ten feet of dry sand was removed in 25 seconds and an equal amount of wet sand in 105 seconds.

Bore left smooth by tool

Upon completion of the tests, the insides of the ducts were examined by several of the engineers and found to be in perfect condition. In the places where the concrete obstructions were removed the original surface of the duct was found to be smooth and polished. Where the fiber was cut away the new surface was finished and smoothed so that even original imperfections in the fiber could not cause injury to the most delicate cables. Most of the men agreed that this indicated that there was no danger of injuring duct lines while rodding, threading or removing obstructions with the motor.

The exhaust from the air motor blows the removed particles out behind, it being reported that the débris can be ejected 500 ft. behind the head into the manhole. When long runs are being bored the articulated air tube can be backed or "railroaded" into the opposite duct (after disconnection of the air hose) or the tube can be quickly separated and taken out in 3 to 5-ft. sections. This procedure can be used to remove the débris when the ejection distance is too great for the air discharge.

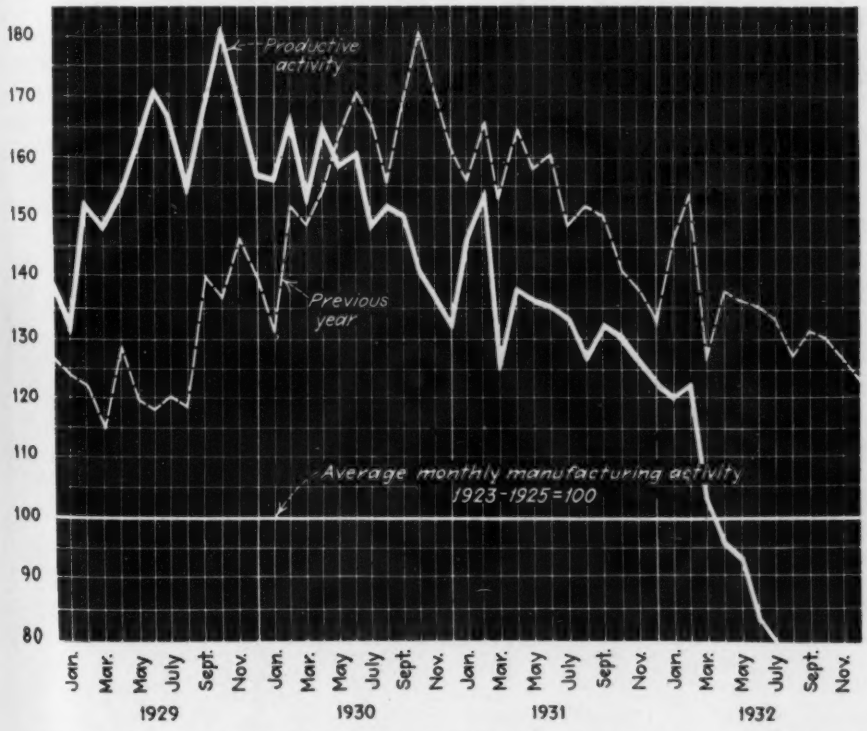
To illustrate the ability of the tool to bore a straight horizontal run for a duct, where excavation is impractical, such as at concrete highways, railroad tracks, etc., a hole was bored through 12 ft. of undisturbed earth in a vacant lot in 40 minutes. This was done despite the fact that the bore had to go through a mass of tree roots, which would have made excavation very difficult. One man standing in a 3-ft. square pit did the work. The boring head emerged just slightly below the pre-selected point. The high speed of the bore-head prevents the deflection usually encountered in low-speed drilling.

In performing this job a metal bracket carrying the guide for the boring-head tube, and a lever for forcing it into the earth, was suspended from a 6x6-in. timber laid across the top of the pit. No additional guidance was necessary after the boring started. The bored hole was clear all the way through. The temperature of the boring head operating at high speed seems to sear or crust the surrounding earth and prevent cave-in. When boring through loose or wet sand the boring head is placed inside a pipe, advanced with the boring head.

It was reported that eight single-duct underground crossings (the longest 60 ft.) were made in the Bronx River Parkway in two weeks of eight-hour days using only two men. The débris was blown out behind the motor into the manholes.

▼ ▼ ▼

Electrical Manufacturing Still Slack



Activity in the electrical manufacturing industry in the United States as a whole fell off 5 per cent in July compared with June, according to the reported energy consumption in plants of that group. Thus the downward movement, that has been in progress fully 2½ years, continues. Since July, 1931, it has amounted to 40 per cent.

A month ago the statement was made that the decline was somewhat greater in the Middle West than in other important electrical manufacturing regions. That change has now been accentuated to the extent that the entire decline in the country-wide average is due to what occurred in the North Central area, where a decrease approaching 20 per cent from June more than balanced the gains of 2 to 4 per cent in the East.

Monthly Index of Electrical Manufacturing Activity

Adjusted to 26 working days
Base: Average Month, 1923-1925

Month. . .	1929	1930	1931	1932
January. . . .	131.3	156.2	146.6	120.0
February. . . .	151.8	165.2	154.3	122.2
March.	148.3	153.0	126.1	102.9
April.	154.6	164.9	138.1	95.6
May.	163.5	158.0	136.7	92.8
June.	170.5	160.2	135.2	83.1
July.	166.6	148.5	133.4	79.2
August.	155.4	152.2	126.9	. . . . .
September. . .	168.8	150.0	132.6	. . . . .
October.	180.6	140.6	130.4	. . . . .
November. . .	169.5	137.5	126.9	. . . . .
December. . . .	157.0	132.4	123.5	. . . . .

This downward movement in the Central area was quite general, affecting a majority of the companies.

Activity in the group of very large establishments increased somewhat over June, though not quite recovering the May rate. It decreased in the group of smaller ones, considered as a whole. In June the movement of both groups were nearly parallel.

Three-Conductor, 27-Kv. Oil-Filled C

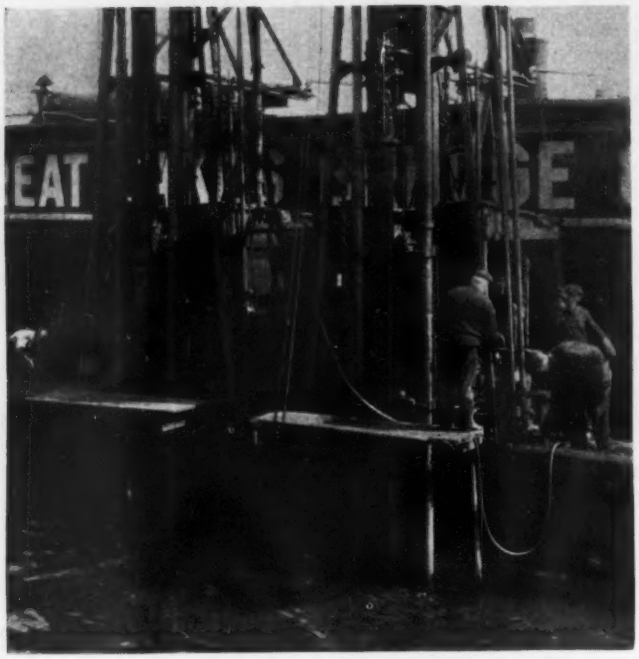


Fig. 1—Drilling bottom of East River preparatory to blasting trench

INSTALLATION of fourteen 27-kv., three-conductor, 500-000-circ.mil submarine cables under the East River was completed July 21 between Hudson Avenue station of the Brooklyn Edison Company and the downtown Manhattan system of the New York Edison and the United Electric Light & Power Companies. Seven of these cables are oil-filled—the first three-conductor, 27-kv. oil-filled cables to be used under water. The remainder are of the "solid" type.

These cables are joined to land cables in manholes on the Manhattan side and tie in with the 13.8-kv. system through 27/13.8-kv. auto-transformers, diversifying the supply to the system by augmenting the feeders from the Manhattan generating stations of the New York Edison and the United Electric Light & Power Companies at Sherman Creek, Hellgate, Waterside and East River.

The installation just completed is also interesting because it had to be made at a point where the tide and river eddies are particularly troublesome, requiring novel installation and construction methods to avoid interfering with the dense river traffic and prevent interruption of service by fouling of anchors.

Drilling of the river bottom for preparing a trench was begun March 14, 1932, and despite 34 days' delay in equipping dredges all of the cables were installed by July 21, a little more than four months. About 1½ months' additional work is required for backfilling and bulkhead work before placing the cables in service.

In order to obtain federal and local approval it was necessary to lay the cables in a trench in the river bottom, which is 10 ft. wide and 3 ft. deep in rock and 10 ft. deep in mud and silt, the silt section being back-filled and the rock section covered with concrete. The greatest depth of the bottom of the trench is about 70 ft. below mean low water, or about 76 ft. below high tide.

The general contract was let to Allen N. Spooner & Sons, Inc., who, in turn, sublet the trench work to the Great Lakes Dredge & Dock Company.

The trench was drilled, blasted and excavated without divers, despite its depth. Vertical drills were mounted on an anchored drill boat and so arranged on carriages that they could be moved horizontally. The position of the drills was assured by the use of "ranges." Holes were drilled 5 ft. apart and dynamite lowered into the holes through tubes. For excavating, use was made of a dredge with an extra long boom and an extra-heavy-toothed bucket, the teeth of which smoothed up the projections left by rock fracture.

The cable was supplied by three manufacturers: Okonite Callender Cable Company, four solid cables; General Cable Corporation, three oil-filled and two solid; General Electric Company, four oil-filled and one solid. To have continuous cables from manhole to manhole all the cables were delivered in 2,330-ft. sections on reels. These were transferred from railroad cars to lighters and thence to the cable-laying barge by derrick.

The solid cable is of the shielded type with 345 mils of paper on each conductor and an over-all cable diameter of 4.36 in. The oil-filled cable has 200 mils of paper over each conductor and 3.69 in. outside diameter. All cables are steel wire armored and covered with two layers of jute. The oil-filled cable was delivered filled and with the inner end connected to an oil reservoir in the reel.

Two cables were laid simultaneously, the oil-filled being installed the same as the solid cable with some exceptions, which are explained later. The accompanying sketch will illustrate the method of laying. Scow anchorages were attached below mean low water level to piles on the Brooklyn shore upstream and downstream from the

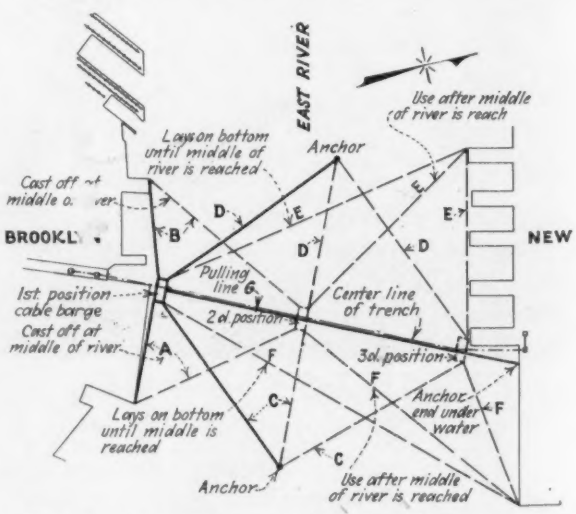


Fig. 2—Anchorage lines for propelling and aligning cable-laying scow

See text for explanation

d Cables Under East River

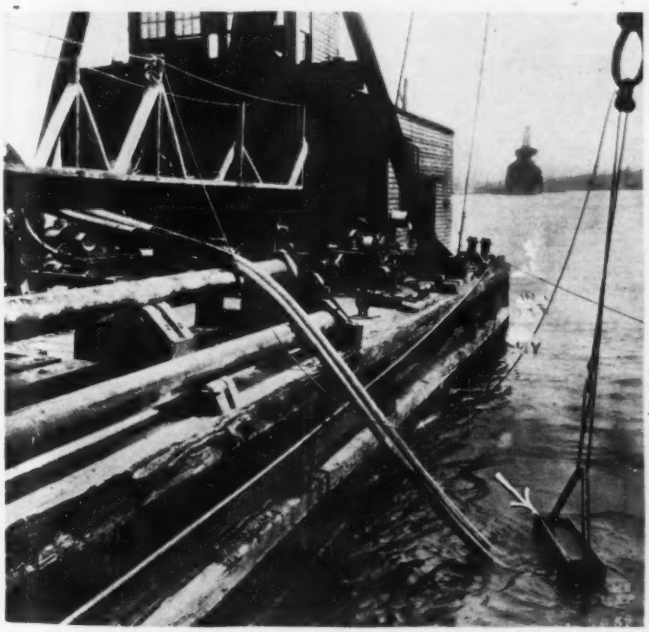
center line of the trench and on the New York shore in a similar manner. An extra anchorage was placed on the New York shore in line with the trench. Two anchors were placed in the middle of the East River upstream and downstream from the center line of the trench. From these anchors lines were run to separate steam winches on the four corners of the cable reel scow. The cable reels were placed on cradles on the scow with their axis parallel and transverse to the line of the trench, so that two cables would be unreeled simultaneously over two parallel rollers at the end of the scow, which prevented excessive bending of the cable when it was paid out. Tugboats were stationed upstream and downstream from the trench line, which by signs and whistles warned river traffic of the instaliation in progress and the proper course to take to avoid fouling the anchorage lines mentioned. It will be explained later how a traffic lane was kept open during the entire construction procedure. Warning signs were also placed on the cable-laying scow.

Owing to the size of the cable scow, it was impossible to approach the Brooklyn shore closer than 150 ft. Consequently, to place the land end of the cable, a winch truck was backed up to the manhole on the Brooklyn side, a steel line threaded through the duct to the river bank and attached to the cable ends. The cable ends were prepared for pulling as shown by the accompanying sketch, with the exception that on the oil-filled cable a pulling eye was left on the cable end.

Oil reservoirs were connected to the inner ends of the oil-filled cable at the factory and remained connected until the installation was completed. While the cables were being laid an oil-treating-and-filling truck was stationed at the manhole and connected to the outer end of the cable to assure a positive oil pressure within the cable to overcome any tendency to lose pressure because of change in temperature.

Fig. 3—Dredge with long boom and toothed bucket used in excavating river-bottom trench

The following procedure was adopted in laying the cables: The Brooklyn anchorage lines A and B were slacked off and lines C, D and G pulled in by the barge winches. Lines E and F were left slack until the cable scow reached the middle of the river to allow traffic to pass. When this position was reached anchorages C and D served in place of A and B, which were then removed and lines E and F drawn up taut by the winches. By



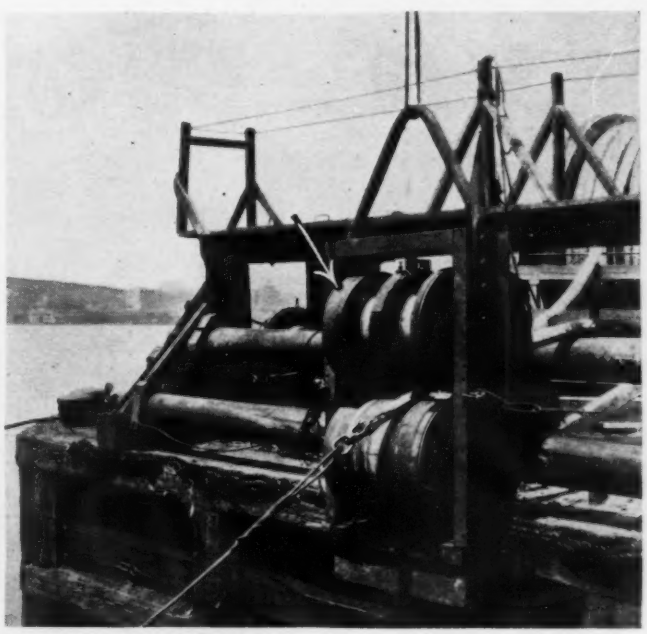


Fig. 4 a and b—Two cables being laid simultaneously

Note rollers and submerged guide that could be adjusted to compensate for drift of cable-laying barge.

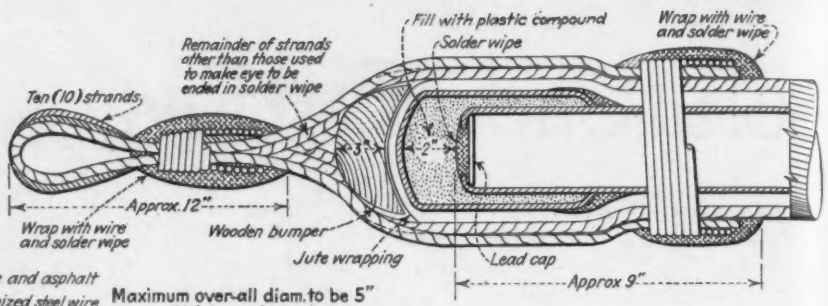


Fig. 5—Pulling eye for submarine cable

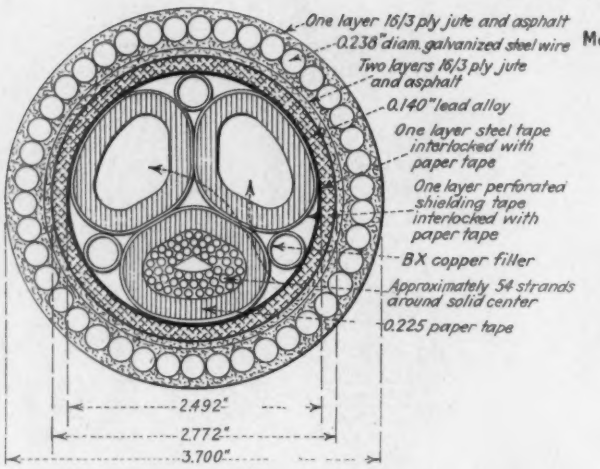

One layer 16/3 ply jute and asphalt
0.238" diam. galvanized steel wire
Two layers 16/3 ply jute and asphalt
0.140" lead alloy
One layer steel tape interlocked with paper tape
One layer perforated shielding tape interlocked with paper tape
BX copper filler
Approximately 54 strands around solid center
0.225 paper tape
2.492"
2.772"
3.700"
Maximum over-all diam. to be 5"
Not drawn to scale

Fig. 6—Cross-section of 27-kv., three-conductor submarine cable

slacking off lines C and D and drawing up lines E, F and G the scow was moved to the Manhattan side.

Even with the anchorages shown, the cable scow would move 10 to 15 ft. off the line of the trench due to the tide and eddies, so an adjustable cable guide was lowered into the river to assure laying the cable in the trench. This guide consists of two paralled rollers, the lower one solid and the upper one in two parts to separate the two cables. It was suspended from a boom on the scow, the head of the boom being kept in line with the terminals of the trench.

When the New York side of the river was reached by the cable scow the end of the cable still on the reels had to be pulled into an open trench containing a right-angle bend to the manhole where the cable is joined to the land cable. For this operation another scow was brought up next to the cable scow, on which the remainder of the cable could be coiled in a figure 8 with the end free so it could be pulled into place. To effect this transfer a large diameter sheave suspended from a derrick was put under the cable and raised and lowered until the cable was entirely unreeled. The oil reservoir in the reel was disconnected and the cable end prepared for pulling. A winch truck was backed to the manhole and a steel line fed along the trench around a vertical-axis cable reel at the bend (serving as a guide), attached to the cable ends on the scow, and the cable pulled into place. Then the cable was attached to a temporary oil reservoir until permanent arrangements could be made.

Stop joints were used between the oil-filled cable and the land cable, the same type being used for both the General Electric and General Cable Company cable.

It should be observed from the foregoing that every precaution was taken to avoid unnecessary or excessive handling and bending of the cable by using large diameter sheaves, guides, feed-out rollers on the scow, etc.

The foregoing information was secured from C. T. Hatcher, transmission and distribution department, United Electric Light & Power Company.

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Police Value of Street Lights

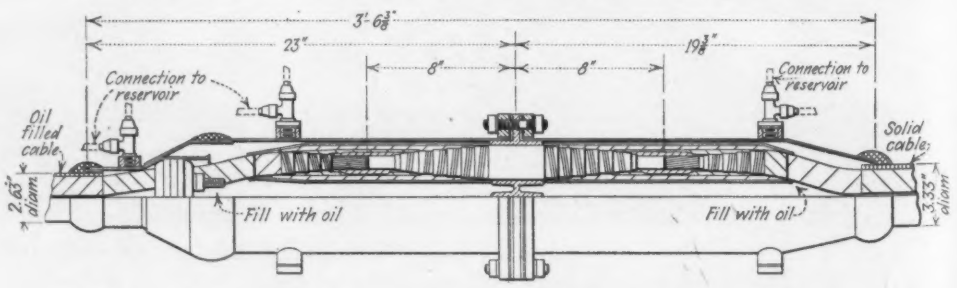
Way back in December 5, 1884, Sir W. H. Preece (father of Arthur Preece, consulting engineer, Queen Anne's Gate, Westminster, S.W.1) presented a paper in the *Journal* of the Society of Arts in which he said:

"There is a point that will lead to the introduction of the electric light that is very marked in the United States, viz., its influence, when applied to the streets, upon the morality and safety of the public.

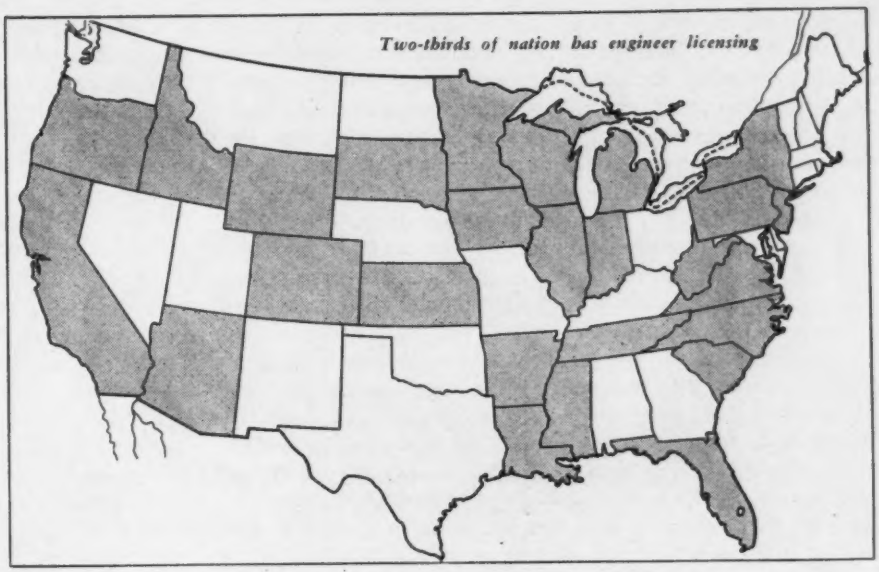
"The Chief of Police of New York has gone so far as to say that 'every electric light erected means a policeman removed. This, though probably not true as regards actual numbers, is so far true, in fact, that the supervision of the streets and thoroughfares is rendered far simpler when they are brilliantly illuminated by the electric light. Its moral effect is principally to be noticed by the way in which it has checked the formation of crowds and disturbed the haunts of those who, unfortunately, infest most great towns and cities, and who render the streets of London at night a disgrace to modern civilization."

Shielded oil-filled cable—500,000 circ.mil, 3-conductor, semi-sector; paper insulation around each conductor = 0.2 in.; thickness of shielding tape around each conductor 0.004 in.; thickness of over-all tape 0.004 in.; thickness lead sheath = $^9/_{64}$ in.; diameter of armor wire 0.238 in. ***Shielded-type solid cable***—500,000 circ.mil, 3-conductor, semi-sector; thickness of paper insulation around each conductor = 0.345 in.; shielding tape (see oil-filled cable); lead sheath = $\frac{1}{8}$ in.

Fig. 7—Oil-stop joint for joining oil-filled submarine cable to solid cable



By PARKER H. DAGGETT
Dean College of Engineering,
Rutgers University,
New Brunswick, N. J.



Some Trends in Engineering Registration

A MAJORITY of the states now have more or less comprehensive laws governing the registration or licensing of professional engineers. Those 26 states cover 55 per cent of the area and embrace more than 65 per cent of the population of the United States. During recent years registration laws were passed by the legislatures in Ohio and in Washington, but were vetoed by the governors of these states, in the first because the law provided for the licensing of corporations and partnerships and in the second because the law was too drastic.

In a few states the law covers only one branch of engineering, e.g., in Illinois, structural engineering, and in Louisiana, California and Wisconsin, civil engineering. But 21 out of the 26 states have comprehensive laws embracing all branches of professional engineering.

The number of years of professional experience required for a license varies from ten in Pennsylvania, West Virginia and Kansas, to none in Louisiana. In the latter state, however, an examination is required which could not possibly be passed by a person without a reasonable amount of professional experience. The majority of the states require at least six years' experience.

For graduates of an approved engineering college seven states require no professional experience, ten require two years and five require four years. In a few states the law specifically recognizes engineering teaching in an approved school as equivalent to practical experience. Where the law does not specify, however, the majority of the boards have so considered it.

Practically all of the laws contain a clause under which the several boards have been obliged to register an applicant on his sworn statement that he was actually making his livelihood by practicing engineering at the time the law went into effect. These clauses usually carry the proviso that application must be made within one year from the time of the passage of the act. This provision, which has come to be known by the state boards as "the grandfather clause," has been responsible for a great deal of the unjust criticism to which some of the boards have been subjected. Under it, they have been obliged to register a number of applicants who otherwise would have been turned down. Experience has shown that the registration boards have been able, in one way or another, to eliminate many of these "grandfathers." The situation in this respect will, of course, gradually right itself, as it did with the lawyers and physicians whose registration laws were initially handicapped by these same grandfather clauses.

One of the earliest problems which the registration boards encountered was that of reciprocity between states. In order to solve this problem, the boards in existence in 1920 organized the National Council of State Boards of Engineering Examiners, consisting of one representative from each state board. The purpose of this council, as defined in its constitution, is "to promote uniformity of practice in the administration of state registration laws for professional engineers and land surveyors, to establish and maintain a system of national qualification for registration, to provide for reciprocal relations between state boards, and to foster any movements having for their aim the promotion of the public welfare through engineering registration and the improvement of professional standards."

This body in 1923 adopted articles of agreement on reciprocal registration, under which a so-called reciprocal card could be issued to properly qualified registrants. This card has been recognized by those boards which have subscribed to the articles of agreement as *prima facie* evidence of qualification. The membership in this council on January 1, 1932, comprised 24 of the 26 boards, and 21 boards had been issuing reciprocal cards under this plan. At the last annual meeting of the council machinery was set in motion to establish a national bureau of engineering registration.

The purpose of the bureau would be to investigate and verify the records of applicants and to issue to those who fully comply with the standard requirements for registration adopted by the council a "certificate of qualification," which may be used as evidence of qualification for

registration in those states agreeing to recognize said certificates, for membership in state and national engineering societies, for presentation to engineering colleges in connection with the award of professional degrees, for presentation to clients when soliciting contracts for professional services and for presentation to employers when applying for positions.

A conference of representatives of twenty national and state engineering organizations last summer adopted definite educational standards as part of the general requirements for registration in the model registration law. This model law has been used in the past as the basis of practically all of the laws that have been passed, each state making such modifications as found necessary.

At present writing only one state, New York, has any educational requirements in its registration law and that only demands a high school education. As stated in the new draft of the model law, "minimum evidence satisfactory to the board that the applicant is qualified for registration as a professional engineer" shall be:

(a) Graduation from an approved course in engineering of four years or more in a school or college approved by the board as of satisfactory standing, and a specific record of an additional four years or more of active practice in engineering work, of a character satisfactory to the board, indicating that the applicant is competent to be placed in responsible charge of such work.

Graduation is thus placed at the head of the list of three possible methods of qualifying. Those who cannot qualify by graduation must have had eight years of acceptable experience and must pass an examination "designed to show knowledge and skill approximating that attained through graduation from an approved four-year engineering course," or must have had twelve years of lawful active practice, including five years in responsible charge, and must be not less than 35 years of age.

Regardless of the time it may take to translate these recommendations into legal requirements, it is nevertheless significant that the engineering profession has agreed to adopt educational standards on a par with those of the other learned professions.

Excerpts from amendments to the New York law signed by Governor Roosevelt in March, 1932, read:

Prior to January 1, 1937, the board may exempt from all or any part of the examinations a graduate of a college or school of engineering registered by the department as maintaining satisfactory standards.

Every person applying subsequent to January 1, 1937, for a license as professional engineer shall be required to pass the examination and before admission thereto shall submit evidence that he graduated from a college or school of engineering registered by the department as maintaining satisfactory standards.

Every applicant for license as professional engineer, otherwise required to take an examination, shall be required in addition to all other requirements to establish by written examination his competency to plan structural designs and supervise the construction of buildings and similar structures.

These requirements if copied by other states have considerable significance to electrical and mechanical graduates because few colleges have any structural courses. The New York law sets a very high standard.

Practically all of the laws as they now exist place upon the registration board the duty of determining what is an engineering school of approved standing. At the time the articles of agreement were drawn up by the national council no attempt was made to go further than to define an approved school of engineering as one which "requires the equivalent of a high school or preparatory school diploma as an entrance requirement, and demands the equivalent of a four-year course in engineering for graduation."

For some time it has been felt that more comprehensive and discriminating standards were needed. Accordingly, at the last meeting of the council its committee on accredited schools was directed to proceed with the classification of engineering schools, according to standards to be determined in co-operation with the professional organizations concerned. This committee is expected to report shortly, although it will still welcome advice and assistance from any source.

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Induction Heating of Greenhouses

By G. N. HAWLEY and M. R. ARMSTRONG
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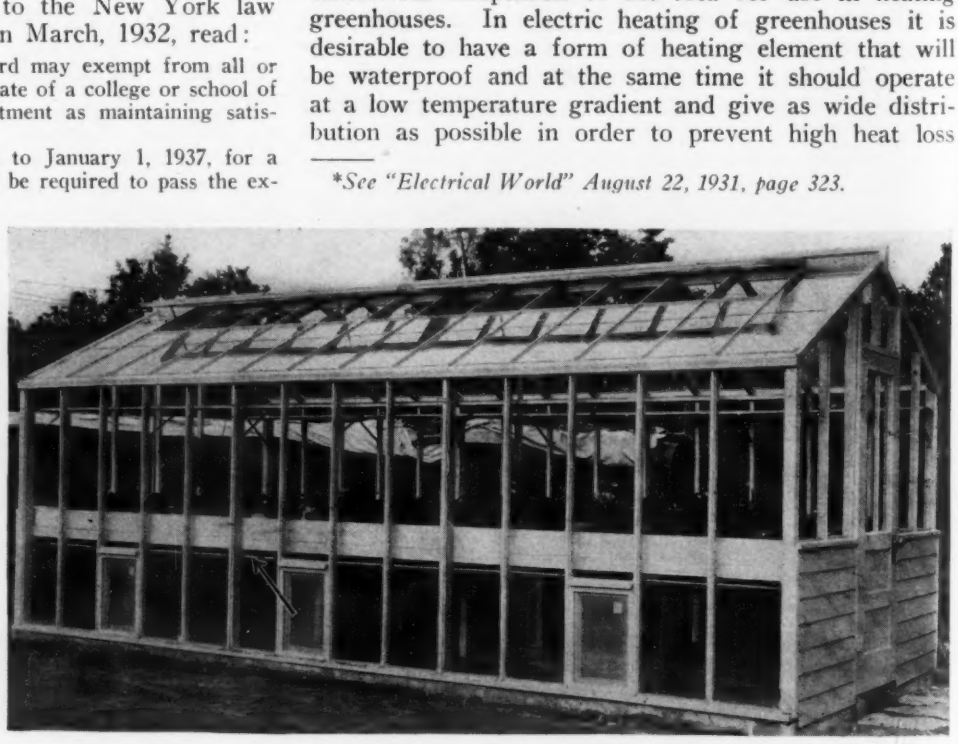
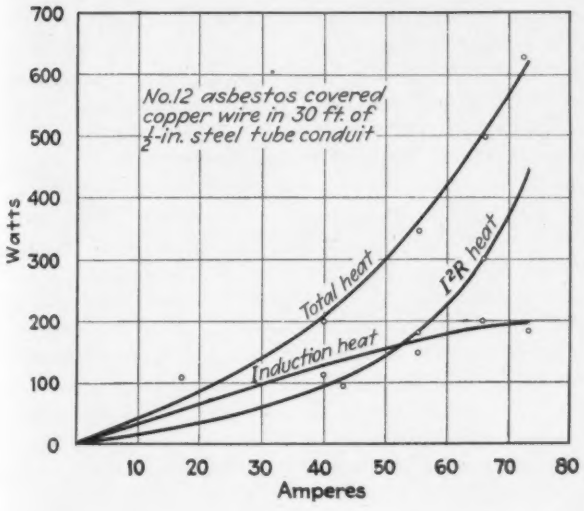
Tests* made by the Southern California Edison Company, Ltd., to determine the heating effect of single a.c. conductors when inclosed in steel conduit has led to commercial adaptation of the idea for use in heating greenhouses. In electric heating of greenhouses it is desirable to have a form of heating element that will be waterproof and at the same time it should operate at a low temperature gradient and give as wide distribution as possible in order to prevent high heat loss

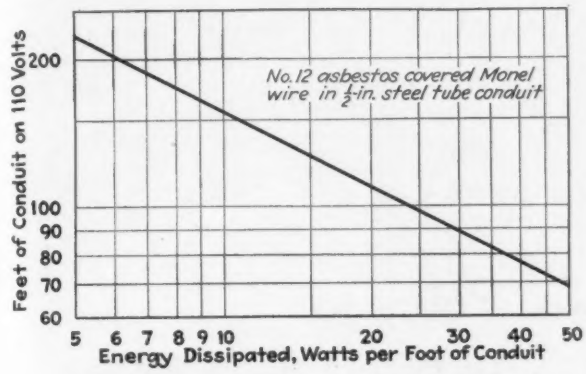
**See "Electrical World" August 22, 1931, page 323.*



Exterior of electrically heated greenhouse

Heat produced by No. 12 copper wire in ½-in. "Steeltube" conduit mounted in four parallel rows under each hotbed.




No.12 asbestos covered Monel wire in ½-in. steel tube conduit
Feet of Conduit on 110 Volts
Energy Dissipated, Watts per Foot of Conduit

Figs. 1 and 2—Heat dissipated by conduit containing single a.c. conductor

through the glass roof due to the rapid circulation of air.

Tests made with No. 12 asbestos-covered copper wire incased in ½-in. "Steeltube" conduit are shown in Fig. 1. It was first believed that the power factor of such a system would be quite low, but tests showed that values around 90 per cent will be obtained in practice. This is probably due to the fact that very few ampere-turns are used to excite the iron and therefore the magnetizing current is small.

Encouraged by results obtained in the tests with copper wire an actual installation was made in a small greenhouse near Pasadena. In this case No. 12 asbestos-covered monel wire in ½-in. "Steeltube" was used as it was desired to cut down the number of feet of circuit required so as not to crowd the space available for the heating system. One circuit consisting of 158 ft. of wire and conduit was connected to the 220-volt supply, taking 5.9 kw., or an energy dissipation of 37.5 watts per lineal foot. At this rating the temperature of the surface of the conduit came to 240 deg. F., when the surrounding air temperature was 75 deg. The expense, including thermostatic control, was only about one-half that for an equivalent steam or hot water heating system. The greenhouse is 9 ft. wide by 20 ft. long and 8 ft. to the ridge.

From results of these tests an empirical curve, shown in Fig. 2, has been calculated. About 25 to 40 watts per foot is recommended for greenhouse and general air-heating work. Higher temperatures would be desirable in case the conduit was buried in the soil for propagation work.

During December and January last some observations were made to determine the consumption of energy required to keep the temperature of the house at a minimum of 54 deg. It appears that about two-tenths of a watt per square foot of glass area per degree temperature difference between outside and inside air is required to heat the house. This seems to be a safe average figure. On still nights the figure dropped to 0.15 watts and rose to 0.3 watts on windy nights. Since the greatest heat loss from the house occurs through the glass, it is sufficient for all practical purposes to multiply the glass area of any house by the above figures to find the amount of energy per hour required for heating.

The foregoing is offered simply as a report of tests made in conjunction with this installation and not as a complete investigation of the merits of electric greenhouse heating. No doubt other installations of this character will follow and an exchange of information would be desirable.

▼

Eccentricity Meter Speeds Starting of Cold Turbines

By C. P. SODERBERG

Westinghouse Electric & Manufacturing Company

The most important part of the operating cycle of a steam turbine occurs at the start. Admission of hot steam to the cooler spindle and cylinder is hardly ever accompanied by uniform temperature distribution and there results distortion in these bodies with reduced clearances and center of gravity displacements. The majority of body and blade rubs and severe vibrations are produced at this time. Slowly roiling the spindle while admitting the steam has helped greatly in producing a uniform temperature field, yet even with this precaution eccentricity of the spindle frequently occurs. As the admission of steam is continued, a symmetrical temperature distribution is gradually produced, but until then the spindle eccentricity is the determining factor in bringing the unit to speed.

The instrument shown in Fig. 1 has been developed to

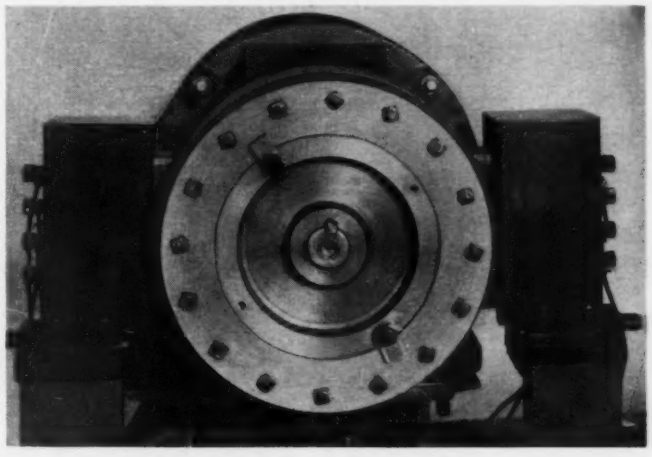
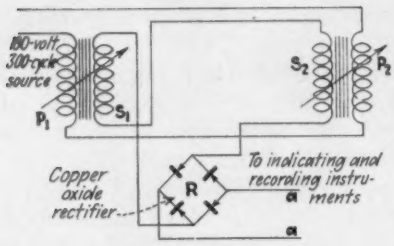


Fig. 1—Eccentricity meter applied to section of turbine shaft



Conversion to direct current, accomplished through action of copper oxide disks, is advantageous since it permits use of a potentiometer measuring circuit, calibration of which is entirely independent of origin of disturbance. Thus, measurements made in the machine may be transmitted to any other convenient point far distant from source without error.

Fig. 2—Electrical connections permit remote indication or recording

record electrically this eccentricity. It employs an electromagnetic measuring circuit in which there is no contact between the measuring circuit and the rotating shaft. On each side of the shaft, a small section of which is shown in Fig. 1, is mounted a transformer. The magnetic path of each transformer consists partly of its own unsaturated core, partly of the shaft and partly of the air gap between the shaft and the transformers. The design is such that the reluctance is centered in the gap, being a linear function of the length. On the primary windings, connected in series, is impressed a 300-cycle current at relatively low potential. The secondaries are connected (Fig. 2) across a copper oxide rectifier in such a manner that their induced voltages are opposite.

When the air gaps of the two transformers are equal there is no potential across the indicating and recording instrument terminals *a-a*, but if there is an eccentricity in the rotating shaft there occurs a variation in the air gap, and the inductance of the two magnetic circuits varies periodically with the movement. An inspection of Fig. 2 will reveal that when the voltage is high on one side it is correspondingly low on the other, and there results a differential voltage across *a-a*, the magnitude of which is a function of the shaft eccentricity. A graphical record is shown in Fig. 3.

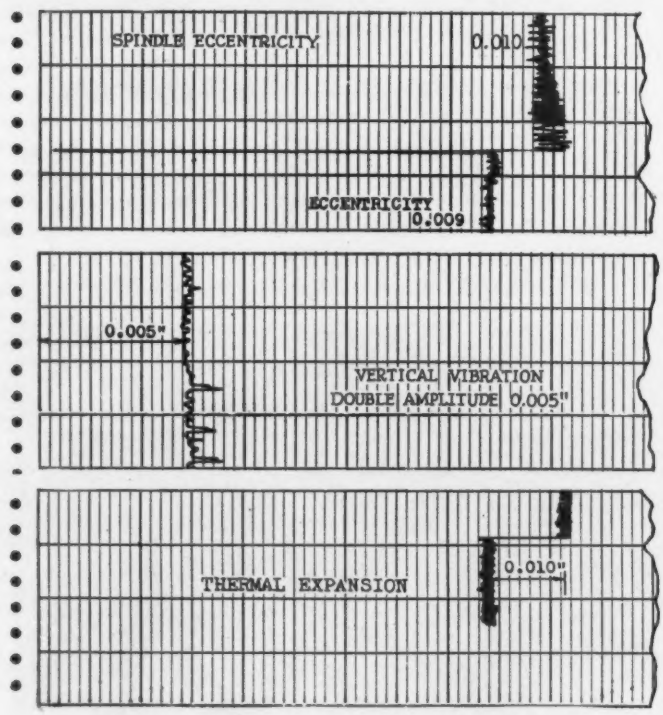


Fig. 3—Sections of records made with eccentricity meter

Top, spindle eccentricity; middle, vertical vibration; bottom, thermal expansion.

The instrument has been designed to fit between the gland casing and bearing pedestal of the turbine, without increase in the axial length of the machine. New machines will be built with a properly finished shaft section for this application, but on machines now in service a small ring should be fastened to the shaft. The coils are wound with aluminum wire, the oxide film forming a resistant coating that will afford insulation at high temperature and under severe moisture conditions. The balanced circuit automatically adjusts itself to changes in the shaft diameter produced by temperature, while the electrical circuit is independent of temperature changes since it is largely reactive. With the transformers in a horizontal center line, the position of the journal on top of the oil film at slow speeds will not result in a false indication.

The operation of the instrument may be made entirely automatic under the control of relays actuated by a tachometer. Signal lights or alarms connected to the measuring circuit will inform the operator when the eccentricity is within the prescribed value and the machine may be brought to speed with the minimum of delay. In addition, the graphical records of starting eccentricity will prove of value to the plant engineer in his study of operating performance.

▼

Swiss Policy to Electrify Railroads

Nearly 3,000 miles of electrified railroad track were reported for Switzerland in the latest analysis issued by the N.E.L.A. committee on electrification of steam railroads, 2,352 miles of which belongs to the Swiss Federal Railways. This road operates at 15,000 volts, single phase, 16⅔ cycles. Among the reasons given for electrifying the Swiss roads are: To reduce transportation charges, save fuel, utilize available water power, negotiate heavy grades, permit tunnel operation and increase haulage capacity. So far as the Federal system is concerned, electrification is a national policy. This road reports that experience has proved that electrification has effected operating economies and given better service.

The year 1930 was a memorable one in Swiss railroading. It marked the 50th anniversary of the St. Gotthard tunnel (9.1 miles long), which was the longest railroad tunnel in the world until 1905, when it was exceeded by the Simplon tunnel (12.3 miles). The contact system of the latter was changed from three phase to one phase in 1930 to permit operation of the Swiss Federal Railways without changing locomotives. The same year the Seethal Railway, a part of the Federal system, was changed to one-phase operation and the

	Train-Miles		Energy Consumption (1,000 Kw.-Hr.)	No. Tunnels	Ruling Grade, Per Cent
	Passengers	Freight			
Montreux-Oberland	807,820*	142,922*	3,800	18	7.2
Rhaetian	959,581	116,170	14,935	77	4.5
Swiss Federal	16,746,164	7,741,384	394,000	148	2.7

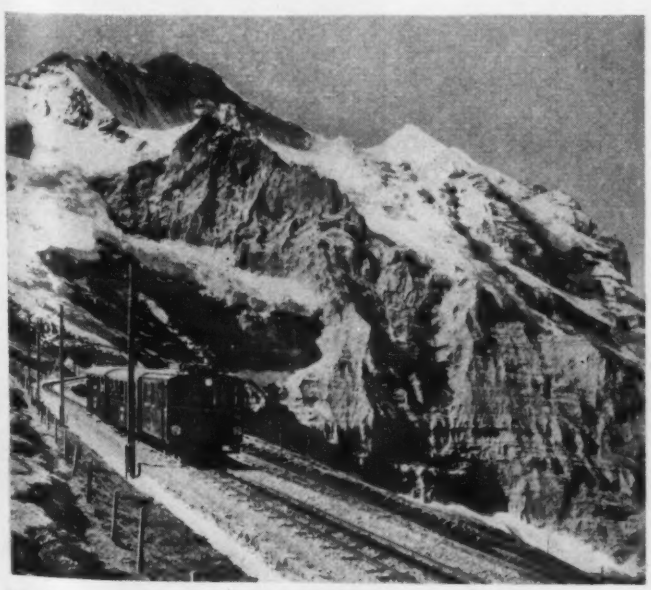
*Car-miles.

Photos courtesy of Brown, Boveri & Company, Ltd.

Lauterbrunnen Valley framed in snow-clad peaks from Wengern-Alp rack-and-pinion railway of Bernese-Oberland system

Federal railways added ten electric passenger locomotives, ten electric freight locomotives and one electric motor car, bringing the total number of these units up to 307, 86 and 56, respectively. Two of the new locomotives for the St. Gotthard tunnel line were illustrated on February 27 and March 19. Two large locomotives with six twin motors and grill drive were received in 1930 by the Bernese Alps Railway, capable of developing 51,500 lb. tractive effort at 31 m.p.h. Since the advent of electric drive on the Rhaetian railway it has been possible to pull twice as heavy trains as with the former steam locomotives. Cooking is done in the dining cars with alternating current from the train heating line.

Records for the year 1929 on 2,600 miles of electrified track of the Montreux-Oberland, Rhaetian and Swiss Federal Railways are given in the table on page 282.



Jungfrau and Silverhorn from Jungfrau rack-and-pinion railway

The Wetterhorn from Wengern-Alp railway of Bernese-Oberland system

Service Restoration Expedited After Line Trouble

By L. W. WYSS

Wisconsin-Michigan Power Company, Iron Mountain, Mich.

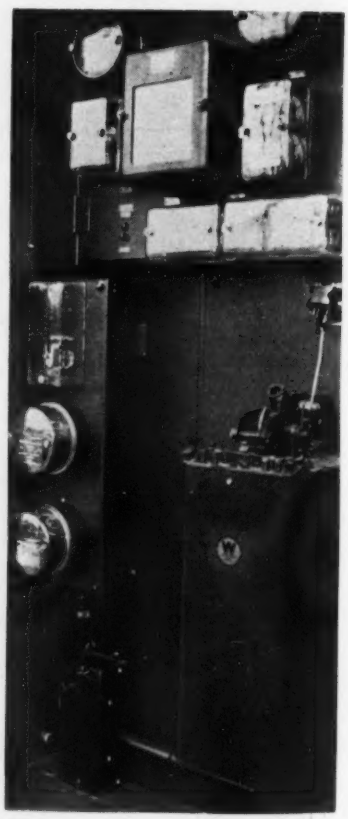
Maintenance of dependable service on a widely spread system supplying sparsely settled territory is doubtless a problem of many companies. That part of the problem which involves prompt restoration of service after line trouble has been largely solved on this system by devising a method whereby a patrolman equipped with an automobile can close remotely located attendantless breakers after the trouble has been cleared.

The district in which this system of remote control has been applied stretches 52 miles (wire route) from Eben Junction, near Lake Superior, to Gladstone, near Lake Michigan. It covers about 440 square miles, includes several small villages and extensive rural districts and involves 103 distribution transformers. The territory is served from a remotely located automatic reclosing substation at Cornell by a three-phase, 13,800-volt transmission line.

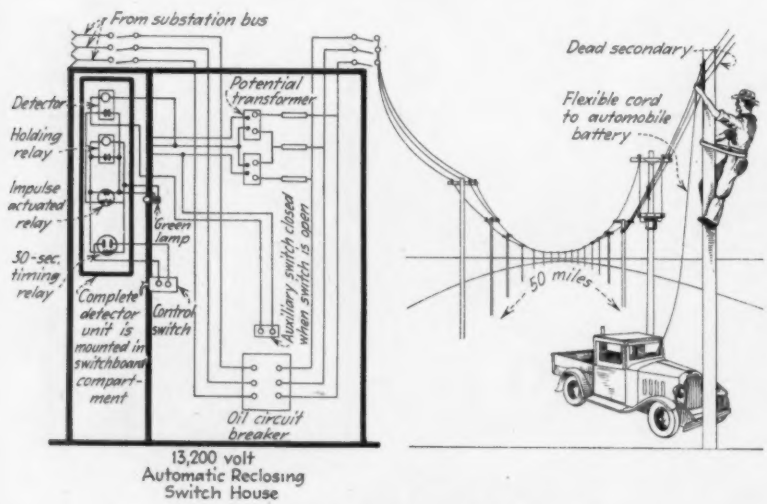
A serviceman is stationed at Rock, which is the central point of this district. The village is 15 miles by wire from the substation and 30 to 36 miles by highway, depending upon snow condition. Singly, this man is charged with the responsibility of maintaining dependable service to all customers in this district. In serious emergencies he may call division headquarters, 80 miles distant, for additional help. After giving due consideration to the serviceman's territory, in the heart of the Upper Penninsular snow belt, we of utility experience can realize that a standard automatic reclosing circuit breaker with manual reset will not be satisfactory to render good service unless there is assurance of reaching an employee at the substation by telephone night or day, which is not possible here.

Formerly, in case of a lockout on the substation circuit breaker, caused by short circuit or other line trouble, it was the practice to open sectionalizing switches to segregate the trouble and restore service to the remainder of the system by manually reclosing the substation circuit breaker. It can readily be understood that lengthy interruptions ensued on account of the distance which had to be traveled in doing this. This is especially true if trouble was at some remote and perhaps quite inaccessible place. A scheme by which this circuit breaker could be closed automatically was diligently searched for. The expense of carrier-current signaling was prohibitive, especially so for the reason that no outside source of electric energy was available when the breaker was opened. Finally, advantage was taken of the fact that when a direct current is applied to either winding of a transformer a direct current impulse is momentarily impressed in the opposite winding. It was found that by utilizing this impulse through proper relays the circuit breaker could be "called in," using 6-volt energy from the storage battery of an automobile.

Referring to the accompanying drawing and assuming that the automatic reclosing breaker at the substation has locked out and it is consequently necessary to restore service with the least possible delay, the serviceman segregates the trouble if possible, attaches a portable two-conductor cord to the terminals of his car battery, takes the free end of the cord, mounts the pole and makes momentary contact approximately ten times across any de-energized 120-volt secondary causing direct-current impulses in the 120-volt winding of the distribution transformer. Transient current impulses in the 13,800-volt winding are transmitted to the potential transformer in the switch house at the substation. At this time the green signal lamp is burning and all 120 volt a.c. power used by attachments is connected to a green signal lamp circuit. When detector relay contacts



Complete detector unit mounted at left of 30x10-in. panel



Transient current from automobile battery closes 13,800-volt switch 50 miles distant

close approximately ten times at about one-half second intervals the impulse-actuated time-delay relay closes its contacts. The closing of these contacts energizes a high-speed holding relay which seals itself in closed position. The same contacts which seal this relay in the closed position also supply power to another time-delay relay which closes its contacts after a 30-second interval. Contacts are wired in parallel with manual switch control contacts and perform exactly the same duty as if the switch were reclosed and automatic relay reset by an operator. A small movement of the circuit breaker when closing opens the special auxiliary switch, so that the detector relay is disconnected from the potential transformer before there is any chance of the potential transformer being energized normally. The green lamp circuit is now "dead" and this de-energizes all attachments and the circuit breaker is in its normal closed position.

If the trouble has been cleared by the open sectionalizing switch the serviceman proceeds to patrol for trouble and makes repairs. If the trouble is between the open sectionalizing switch and the substation it is more than likely that the breaker cannot be "called in," or if it comes in it will immediately lock out again. In this case the serviceman makes further trial by opening a sectionalizing switch nearer the substation. Naturally this procedure may be repeated innumerable times without a single trip to the distant station being necessary.

The switch at the substation has been "called in" by applying battery current impulse to a secondary circuit at a point 50 miles from the substation, the signal carrying through four transformations as follows: 115/6,900-volt, 6,900/13,800-volt, 13,800/13,800-volt and the 13,800/115-volt potential transformer at the substation. Any misgivings regarding the reliability of the detector can be laid aside after this demonstration, particularly when one considers that all of the 103 distribution transformers were connected and absorbing a portion of this transient current.

It was anticipated that lightning surges in the vicinity would operate the detector relay at times when the switch should properly remain open if only a single impulse contact were required for operation. For this reason ten operations of the detector, all consecutively in a period of five seconds, must be applied to "call in" the switch.

Obviously the chance is very remote of lightning duplicating this code. The man sending the signal is safe as he is coding only when the secondary line is de-energized. After his five seconds of coding there is a lapse of 30 seconds before the switch closes. This prevents any possibility of the 120-volt secondary current reaching the man or the 6-volt battery.

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Rural Line Costs in Empire State

An exhaustive report on construction standards and costs of rural electric lines has been completed by the electrical technical committee of the Empire State Gas and Electric Association. It is based on 701.8 miles of rural line built in the last two years by New York State companies.

The average length of the 457 line extensions studied was a little over 1½ miles. There was an average of 5.1 customers per mile and 2.2 transformers per mile. Although substantial changes in rural line specifications have been made in the last few years permitting longer spans and consequently fewer poles, the conditions encountered in running the 701.8 miles analyzed did not permit using more than 245-ft. spans on the average despite the fact that they were designed for 300 to 330-ft. spans.

The data collected have shown that the joint use of poles with telephone companies effects no appreciable reduction in cost, principally because it generally reduces the allowable span lengths. Use of farm labor in digging pole holes does not make any substantial savings in cost, but may be advisable to assist customers in financing their wiring and equipment costs.

Careful analysis of the cost of several reputedly low-cost lines showed in each case that apparent savings were due to ideal conditions, inadvertent omission of certain items of expense, lower-grade construction or combinations of these factors.

Wide variations in cost per mile of line were found, but they are due largely to local conditions over which the

Cost of Rural Lines in New York State

Based on conclusions from study made by Empire State Gas and Electric Association.
See influencing factors in text.

Costs per mile:

(a) Average, including transformers, services and meters	1,806.00
(b) Range, including transformers, services and meters	1,168—2,875
(c) Average. Including secondaries, but excluding transformers, services, and meters.	$1,430.40
(d) Maximum—more than (Same general specifications as (c) but conditions severe.)	2,600.00
(e) Minimum—less than (Same general specifications as (c) but conditions ideal.)	1,000.00

Average costs in per cent of total *excluding* transformers, services and meters:

	Per Cent
(f) Poles* and fixtures installed	54.5
(g) Conductors installed (primary and secondary but not including services)	31
(h) Overhead expenses, chargeable against purchase and installation of (f) and (g)	11
(i) Right-of-way and clearing	3.5

Average cost in per cent of total *including* everything:

(j) Transformers, services and meters including prorated overhead	21

Average per customer costs:

(k) Total including transformers, services and meters	$354
(l) Excluding transformers, services and meters	280
(m) Transformers, services and meters plus prorated share of overhead	74

Cost of experimental underground line *(built in 1931)*

(n) Total inclusive of transformers, services and meters	$1,904
(o) Total exclusive of transformers, services and meters	1,425

*Pole cost is higher in New York than in some other parts of country since no satisfactory native pole timber is available. Installed they cost about 20 per cent of the total cost of the lines excluding transformers, services and meters.

companies have no control, but which nevertheless govern pole spacings, height of poles, number of corner and dead-end structures, number of transformers, lengths of services and other construction details. Limited data available from other states show costs generally comparable with New York figures when the special conditions existing are taken into consideration, the committee reports.

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READERS' FORUM

Claims Inaccurate Quotation

To the Editor of the ELECTRICAL WORLD:

The quotation attributed to me published on page 145 of ELECTRICAL WORLD for July 30, 1932, is evidently an abbreviation of certain statements made by me in an address to the recent convention of the Middle West Division, N.E.L.A., at Kansas City.

I have no objection to your abridging my remarks for publication, but I rather object when the effort to condense results in a mis-statement of what I actually said, as is the case in this instance. The published quotation puts me in the position of admitting that "dealer service" is a restriction on sales of electrical merchandise to rural customers and this is far from my viewpoint. I do not admit nor recognize such a contention.

In my address I stated: "If 'adequate dealer service' is the bottleneck through which rural line merchandise sales are to be brought about, have the utility companies made a proper presentation of this situation to the already established retail channels, or have they attempted to get this business direct?"

The published quotation does not carry this meaning, but makes it appear I agree that "dealer service" is a restricting bottleneck on rural merchandise sales. I do not so agree.

C. H. CHASE,
Secretary Iowa Implement Dealers' Association.

Ames, Iowa.

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Capacitance Transformers for Ground Directional Relays

To the Editor of the ELECTRICAL WORLD:

I wish to call your attention to an error which was made in the publication of my article entitled "Capacitance Transformers for Ground Directional Relays" in the June 18 issue of the ELECTRICAL WORLD. Next to the last paragraph was published as follows: "Since the reactance of the condenser was much closer to its theoretical reactance at 150 cycles (12,700 ohms) than at 50 cycles (4,175 ohms), etc."

This is incorrect and should read: "Since the reactance of the condenser was much closer to its theoretical reactance at 150 cycles (4,175 ohms) than at 50 cycles (12,700 ohms), etc."

Since this error in publication has been called to my attention several times, I trust that you will publish a correction in an early issue.

FRED B. DOOLITTLE,
Radio Engineer.

Southern California Edison Company, Ltd.,
Los Angeles, Calif.

An Advocate of Muddling Through

To the Editor of the ELECTRICAL WORLD:

Your July 23 issue carries an editorial commending a plan, advanced by the Institute of Radio Engineers, to have idle engineers spend their time hunting for improvement possibilities in the processes of their local industries.

Here are some points that the originators of the scheme must have overlooked:

1. The unemployed man has a questionable technical reputation, little standing in his profession, and is therefore disqualified for consulting work. Professional standing is the first requisite of the man who would presume to make studies for others and recommend technical changes in process, and professional standing is almost zero for the unemployed man. The general opinion is that he must be mediocre or he wouldn't be out of work, so he loses that "front" that is more effective than technical ability in the successful consultant. All of us expect our specialists to be of the best, or, at least, to look and act like they were. What is your reaction to the word "unemployed"? Something like bums and breadlines, isn't it? Look at the recent "Positions Wanted" advertisements in the ELECTRICAL WORLD. How proudly some of them say, "at present employed" or "not down and out," the inference being that the unemployed man ranks much below them in the scale of desirability. There's no denying that a man loses caste when he loses his job, and that after he has been fired he cannot claim the confidence or respect of others or himself.

2. The few local industries that are still operating either have no money to spend for new-fangled ideas or no inclination to spend until they can see their way more clearly. The industries that fire their engineers can't claim a monopoly on pessimism. All the rest of industry is just as panicky and just as doubtful as to what the future will bring. They, too, have learned the words, "Come back when times get better, say about 1934."

3. The engineers who are unemployed at present are young fellows, mostly from the technical side. Men who could put across a scheme such as the one outlined would have to be A-1 technicians, and, in addition, the most potent type of seasoned, spellbinding, and wire-pulling salesmen. Unfortunately, that description doesn't fit most of us. An engineer with a single-track mind, grease on his hands, and a wild look in his eyes, the kind of a man who could devise new applications for something as uncanny as a vacuum tube, would be helpless in the face of the petty politics, the indifference, and the covert or open opposition that would appear against him in a strange company. None of us likes to be "showed up" or branded as out-of-date, and the staff of the strange company thinks about unemployment, too.

No, the scheme isn't a cure-all. Fire the fellows who devised it and they wouldn't practice it. They would do just like the rest of us: move in with the home folks, cut expenses to the irreducible minimum, study some, try to sell life insurance or Fuller brushes, hang on, "perhaps in 1934——."

STANLEY GILMORE.

Columbia, Mo.

BOOK REVIEWS

"Electrician" Annual Tables of Electricity Undertakings, 1932

Published by Ernest Benn, Ltd., 154 Fleet Street, London, E.C. 4. 238 pages. Price, 10 shillings net; postage extra.

The forty-fifth annual edition of this excellent and authoritative compilation has just been issued. As in the past, it gives detailed data, including rates, on the electric supply throughout the United Kingdom, listed by localities. British colonial undertakings are similarly covered. A separate table describes the power supply systems. In addition there is, as before, a section on foreign undertakings, necessarily less comprehensively treated than the British and in some respects fragmentary, but nevertheless contributing to make the book as a whole by far the best reference work for the American user who has occasion to look up information on electrical supply abroad.

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First Principles of Television

By A. Dinsdale. John Wiley & Sons, Inc., 440 Fourth Avenue, New York. 237 pages, illustrated. Price, $3.50.

With a fine sense of balance, this British author has given a portrayal of the international status of television. Systems are described in detail with ample diagrams and pictures. It is not highly technical from the electrophysical standpoint. The deadlock in which the new art finds itself both from technical limitations and from public lukewarmness about a half-perfected accomplishment is frankly acknowledged.

The experimentive mind will find the book a potent stimulus to discovery of the key which will open to television the scope and acceptance accorded to sound broadcasting.

•

Economic Control of Quality of Manufactured Product

By W. A. Shewart. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York. 491 pages, illustrated. Price, $6.50.

The author approaches his problem from a statistical and mathematical angle and freely uses calculus, analytics and the theory of probability in attempting its solution. While many of his examples are applied to the control of practical manufacturing problems in the telephone industry, electronic charges and molecular motion are discussed on a basis of equal familiarity.

The layman and even the majority of college-trained engineers who have not had occasion to keep in constant practice with their higher mathematics will skip many pages. Nevertheless they will find many practical suggestions as to methods of compiling and interpreting test data on original experiments and following up quantity production by analyzing results of day-to-day inspection of product.

Compiled from the writer's experience on the staff of the Bell Telephone Laboratories, the book has a definite place in the libraries of research and scientific laboratories. It is distinctly refreshing to see scientific and mathematical analysis applied to the problems of production and inspection. The author points out the necessity of separating causes of defects into assignable causes and what he calls chance causes. He mathematically analyzes the probability of these chance causes producing defectives, and lays down basic formulas for interpreting the statistics of experiments and the percentage inspections of quantity production, particularly with reference to those characteristics which, unlike dimension measurements, cannot be determined without destruction or injury to the product itself and therefore can only be checked on test samples of each lot.

The book would have a wider use had some of the terms been defined and subjects discussed in simpler and more popular language and it is to be hoped that the author will supplement it some time by a more elementary treatment of the same subject.

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Elements of Electrical Design

By Alfred Still. McGraw-Hill Book Company, New York. 575 pages, illustrated. Price, $5.

The edition of 1924 has been brought up to date, higher voltages and more effective utilization of materials having brought new elements of technique into design. Insulation and dielectrics get enlarged attention, as does flux plotting for magnetic and electric fields.

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27. Berichtfolge des Kohlenstaubausschusses des Reichskohlenrates

(Dust from Stacks)

By various authors. VDI Verlag, Berlin NW7; Dorotheenstrasse 40. 40 pages, illustrated. Price, 2.50 reichsmarks.

The committee on pulverized fuel of the German advisory council on coal has been giving serious attention to the problem of separating the solids from flue gases. Several of its published reports deal with that subject. The present one, designated as No. 27, consists of five unpublished studies or reprints from current periodicals assembled in pamphlet form.

Among other things it refers to the unreliability of depending on the visual density of smoke as an indication of the quantity of dust and gives results of measurements on stack samples of the quantity of various size particles from fuel burned on grates and pulverized.

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VDE Fachberichte, 1931

(Technical Reports)

Published by the Verband Deutscher Elektrotechniker, Bismarckstrasse 33, Berlin-Charlottenburg 4. 177 pages, illustrated. Price, paper, 12 reichsmarks; bound, 14 reichsmarks.

The Frankfurt convention, last summer, of the Verband Deutscher Elektrotechniker (VDE) commemorated several important anniversaries. The major theme was long-distance electrical transmission; the papers and discussions centered more or less closely around that theme, broadly considered. As published they are grouped into several classes: Machinery and transformers, power stations, power transmission, interconnection, protective devices and industrial installations. In view of the circumstances they may be accepted as representative of advanced German engineering thought and practice and will interest American engineers accordingly.

Men of the Industry

Ernest L. Godschalk Assumes New Duties in Charleston

At a meeting of the board of directors of the South Carolina Power Company, held in Charleston on July 26, Ernest L. Godshalk was elected a director, vice-president and general manager.

Mr. Godshalk is a native of Kulpsville, Pa. He was graduated from the University of Pennsylvania in 1917, specializing in engineering, and came to

Charleston immediately after his graduation to accept a position as junior engineer with the old Charleston Consolidated Railway & Lighting Company. He remained in Charleston until 1919, when he returned to his native state to become distribution engineer with the Counties Gas & Electric Company at Norristown. He returned to Charleston in 1922 to become superintendent of the electric department of the power company. When several other properties were merged with the South Carolina Power Company in 1929 he was made manager of electrical operations.

Mr. Godshalk is active in Chamber of Commerce matters and is a member of the Charleston Exchange Club and St. Andrews Society.

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ARTHUR W. JACKSON, assistant treasurer of the Buffalo General Electric Company and of the Niagara, Lockport & Ontario Power Company, has been appointed assistant treasurer of the Buffalo, Niagara & Eastern Power Corporation by the board of directors. Mr. Jackson entered the utility field in 1923 when he took charge of the tabulating department of the Niagara Falls Power Company. In 1928 he was made head of the then newly consolidated tabulating departments in the Buffalo, Niagara & Eastern Power Corporation groups.

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H. S. VASSAR, laboratory engineer of the Public Service Electric & Gas Company, Newark, N. J., has been elected a member of the executive committee of the American Society for Testing Materials. Mr. Vassar entered the engineering and operating departments of the Newark utility in 1903, following graduation from Pratt Institute, Brooklyn. He is a member of the American Institute of Electrical Engineers and of other societies.

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OBITUARY

S. T. Bodine

Samuel T. Bodine, chairman of the board of directors of the United Gas Improvement Company, died August 19 in Villanova, Pa., after a long illness. Although long recognized as one of the leaders of the civic and industrial life of Philadelphia, Mr. Bodine was chiefly noted for the important rôle he had filled in the development of the public utility industry in the United States.

Fifty years ago Mr. Bodine became associated with the original United Gas Improvement Company when it was first organized in Philadelphia. In the following half century the growth of that organization into the U.G.I. system of today formed the background of Mr. Bodine's career. Few men in any business activity could point to as brilliant an identification with the development of a great project as he. His constant rise in influence with the company, of which he was such an integral part, was climaxed when he was elevated to the presidency in 1912, a position which he held for fourteen years until he relinquished it to become chairman of the board.

A native of Philadelphia and a graduate of the University of Pennsylvania Mr. Bodine was chosen as secretary and treasurer of the newly created United Gas Improvement Company in 1882. His rise was rapid from then on. In 1888 he was made general manager; in 1892 he was elected second vice-president; in 1904 he was advanced to first vice-president, retaining the position of general manager. After eight years in that position he was elected president of the U.G.I. system. It was on September 1, 1926, that he resigned from the presidency at his own request, to be succeeded by the late Arthur W. Thompson. However, as chairman of the board of directors Mr. Bodine continued to wield a powerful influence upon the policies of the U.G.I.

He had numerous other interests and associations aside from his identification with the U.G.I. Company. At the time of his death he was director of the Fidelity-Philadelphia Trust Company, the Pennsylvania Company for Insurance on Lives and Granting Annuities, the Welsbach Company, the American Gas Company, the Philadelphia Electric Company, the United Engineers & Constructors, Inc., the Philadelphia Electric Power Company and the Susquehanna Power Company.

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DEWITT C. MIDDLETON, 82, pioneer in northern New York power development, died at his home in Watertown, N. Y. Mr. Middleton was a director of the Power Corporation of New York, the Floyd L. Carlisle Company and other local concerns. He was also a director in the Northern New York Utilities, Inc.

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DR. W. H. SCHEURMAN, 73, dean of the engineering department of Vanderbilt University, was drowned near his summer home in Smoky Mountains August 11. Dr. Scheurman was a graduate of the University of Cincinnati and Johns Hopkins. He was a past-president of the Nashville Engineering Association.

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MAX KUSHLAN, an electrical engineer in the employ of the Public Works Department of the city of Boston and a rising figure in the field of technical writing, died recently at Boston following an operation. He was born at Minsk, Russia, in 1885, came to this country in 1904, without the slightest knowledge of English, and was graduated seven year years later from the Massachusetts Institute of Technology in the electrical engineering course. His field experience included connections with the Boston Elevated Railway, Goldschmidt Detinning Company, Sargent & Lundy, Chicago Bascule Bridge Company, Brooklyn Edison Company, Stone & Webster Engineering Corporation and the New England Power Construction Company. Mr. Kushlan was identified with the design of numerous important projects, specializing in the preparation of engineering drawings and allied design details and carrying on considerable supervisory work in industrial and utility undertakings. He was the author of many articles on electrical design in ELECTRICAL WORLD and of three books, Freehand Drawing, The Gas Motor and Kushlan's Handbook of Industrial Electricity.